

Briefing

ISA mission to Mexico

A HIGH-POWERED delegation coordinated by the International Marketing Sub-Committee of the Computing Services Association will visit Mexico later this month on the invitation of the Mexican Government.

The ISA mission, which will include representatives from the Department of Industry, the Central Computer Agency, the National Computing Centre and ICL, will make presentations over three days to some 150 representatives of Mexican government departments and public sector bodies.

"This is the first breakthrough in the ISA International Marketing Sub-Committee," chairman Donald Moore told Computer Weekly. "We will be emphasising the whole range of skills and experience of the UK services industry."

Ferranti sale

THE stake that the NEB holds in Ferranti is being cut from 62.5% to 25% by the sale of shares for not more than £100m. This gives the government a £100m profit on the £100m investment in Ferranti, one of the UK's most successful high technology firms and is intended to make its recent introduction to the stock exchange easier. The shares are being sold under simplified conditions of the deal which gave Ferranti government aid in 1975 (CW, May 22, 1978).

Orbit launch

ORBIT, the IBM mini-based distributed processing alternative to its 3700 communications processor (CW, August 31), is expected to be announced by IBM next week, according to US sources.

More memory

A MAIN memory that can be expanded to one Megabyte and a 2000 nanosecond cycle time is two of the main features of the Eclipse S/250 scientific minicomputer introduced by Data General. Opinions available with the S/250 include a floating point processor, an integral array processor and a fast multiplexer channel offering I/O rates of up to 10 megabytes per second.

COM move

THE computer output microfilm service side of the Lowndes Ajax group has been moved from Victoria in Central London to the company's new headquarters at Milton House, Croydon, Surrey. At the same time a COM service has been installed at Datagraphix 4565 COM Road.

Wimpy's minis

TOTAL of 16 Data General minicomputers with a transaction processing software package developed in the US by the Data Communications Corp of Memphis, Tennessee, are being supplied by the US firm's European division, DCC International, to its first UK customer, enterprise Wimpy and Co, under a £10,000 contract.

'We don't want to be latter-day Luddites' —TUC

IT is imperative that trade unions strike a responsible balance and do not become "latter-day Luddites" in dealing with the human and social problems raised by the introduction of microelectronics.

This was one of the points raised by Bryan Stanley, general secretary of the Post Office Engineering Union, on the opening day of the TUC conference in Brighton, when he moved an eight-point motion relating to employment problems created by technology.

The motion was carried unanimously and the TUC was asked to develop detailed proposals on the subject to time for next year's congress.

"As trade unions we have to strike a responsible balance," said Stanley. "On

the one hand we don't want to be latter-day Luddites, blindly opposing all changes to technology and insisting on the maintenance of existing equipment and skills however inefficient, however archaic and they become. That approach would not only be impractical, it would be counter-productive."

The path to success, Mr Stanley, did not lie with the scientists, the economists or the managers; these groups were too bound up with the technical details of the situation, he said.

"Only the trade unions can insist upon human values coming first, and that the use of new technology must take account of the human and social implications. Technology must serve mankind, not

mankind serve technology."

In his opening address, the TUC chairman David Barnett also pinpointed the impact of microelectronics as one of the main concerns of the unions. He said the combination of new technology and a world recession could hold out the prospect of jobs being killed faster than they were created, but he also pointed out that technology could bring "opportunities as well as difficulties."

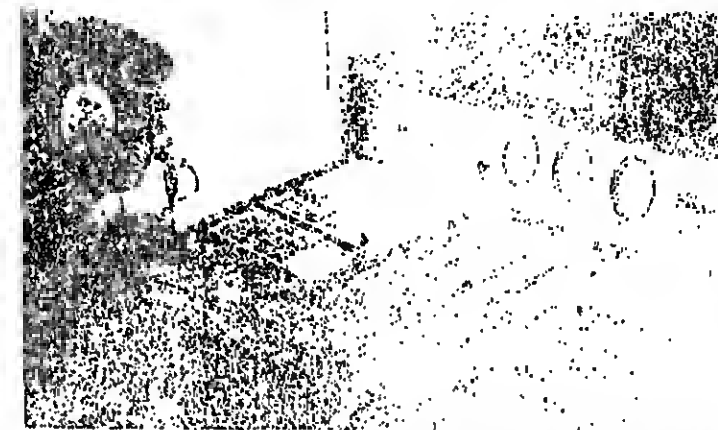
The resolution called on the government to develop forward plans to expand job opportunities in affected areas and to develop a comprehensive study of the social consequences of the technology.

Specialist training was needed, the resolution said, to support the

implementation of "urgent steps" to develop Britain's microelectronics capability and it also said there should be a growth in training and education "to allow the transfer to a high technology society to proceed smoothly."

A public commitment by government to shorter working week and a study of the opportunities offered by increased leisure was called for. International co-operation with other unions and governments was also emphasised.

Speaking in Australia, before the TUC discussions began (see page 9) Lord Avebury criticised trade unions for failing to give a more effective lead in developing plans for a more leisure-oriented society.



Introductions at Farnborough International 78 include a new microprocessor-controlled voice-switching system from International Aeradio, shown here.

Farnborough review — see back page.

IBM and ICL in office challenge

BOTH IBM and ICL have made important moves in the burgeoning automated office market. As a first step towards a full-scale attack on word-processing, ICL is negotiating a large order with a major London-based publisher while IBM has introduced a Text Routing System developed in the UK for the Series 1 which enhances the company's electronic mail and word processing capability.

As exclusively reported (CW, March 23), word processing software has been developed by ICL for the 7502 series of terminal systems and for the 1500 terminal introduced from Singer.

The company has not yet completed its plans for entering the word processing market, and has not decided which of the two products will get the major thrust. The software is already under test at some customer sites.

The signs are that the 7502 series will be emphasised, at least in the UK. There is a wide range of models and configurations of the terminal system, which is configured around a minicomputer specially developed for it within ICL. But it is understood that the word pro-

cessing on the 1500 is being considered as a major market area in the US.

The text routing system from IBM interfaces a Series 1 mini with the Office System 6 to provide a strong electronic mail and shared logic word processing capability.

This facility is an important element in the "automated office" which is currently being attacked by a number of large multinationals, including Xerox, AT&T, Wang and Toshiba (CW, August 24).

● Turn to page 8

Third World is eager for computer power, say conference delegates

THE British delegation to the Split Inter-Governmental Conference on Strategies and Policies for Informatics is returning from the 10-day conference in Yugoslavia impressed with the importance attached to computing by developing countries.

"We have found a great awareness among the delegates that informatics must be a key element in their development strategies," Peter Hall, director

of corporate communications at ICL and a member of the delegation, told Computer Weekly.

"However, the developed countries believe that a pragmatic approach is best, while the developing countries seem to favour grand strategies and national plans."

He cited the UK offer of training assistance as an example of the pragmatic approach (CW, August 31).

Software bundling complaint by users

IBM Computer Users' Association has complained to the company about the marketing of Advanced Communications Function software, an important component of the firm's plans for networking, including Systems Network Architecture.

One aspect of the CUA's objection is the handling of ACF

and VTAM with CICS, which users feel is an attempt to force them into adopting SNA.

In the US, IBM is reported to have made special efforts to help early users of VCF/VTAM. In addition to bugs in the initial software release, problems including timing discrepancies were encountered in the inter-

face to other major systems software.

However, "none of the users contacted reported extreme dissatisfaction with the ACF/VTAM access method or with complementary software products such as ACF/NCP", according to the US publication Electronic News.

COMPUTER WEEKLY'S INSIDE NEWS

HUMAN CHESS WIN

This week, international chess master David Levy won his £1,250 bet that he would not lose a match to a computer chess program in the last year from August 1988. But Levy did not have it all his own way. Computer Weekly carries a match report and a Chesslab by one of the losers of the bet, Professor Donald Michie. Pages 3 and 11

PROFESSIONAL PRIDE

It is sometimes easier to pass a camel through the eye of a needle than to define what is really meant by a "computer professional." But BCS president Professor Paul Smet explains why he believes a valid definition can and should be made to pin down the elusive computer professional. Page 12

WHAT'S IN STORE

Although the spotlight is usually turned on the mainframe processor, the storage media are an equally important part of an installation. In this week's magazine storage media supplement we look at how improvements in storage efficiency can be made, and at developments in the well known floppy disc devices, as well as in the new field of optical memories. Pages 17 and 19

SALES BITE

Our popular Sales Bit column takes an incisive dig at the "rounds call" gambit. Page 53

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Big Beginnings

Terminal Systems/Software/Distributed Processing
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Hardware/Modems/Network Control Systems/
Word Processing/Field Service

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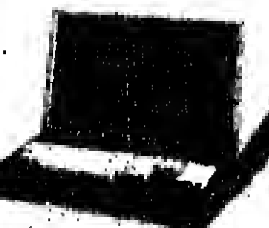
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NEWBURY SMART MICRO-BASED VISUAL DISPLAY TERMINALS



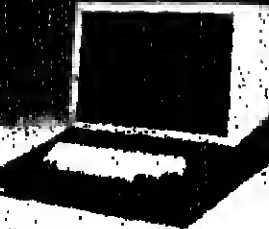
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Right to information: The fight goes on

By Tom Riley

THE publication earlier this year of a White Paper on the reform of Section 2 of the 1911 Official Secrets Act made it clear to those advocating laws on access to information that the government has no intention of bringing in legislation in the foreseeable future (CW, July 10).

The White Paper stated that the US and Swedish experiences needed more study before any implementation was made. It went on to say that "before deciding whether to go further, we shall initiate a more detailed study than has so far been possible of overseas experience and its relevance to our own constitutional system. In order to see what further action, whether by means of legislation or by non-statutory methods, may be desirable, and we shall announce our conclusions from this study in due course."

This caused a furious reaction from those who have been fighting for legislation. The general consensus is that the government is stalling yet again in order to keep tightly clamped down the lid of secrecy that prevents Whitehall from being responsible to the public for its actions. The Prime Minister and his senior ministers have chosen to ignore their own grass-roots elements, those members of the Party that passed a resolution last year urging the initiation of a Freedom of Information law.

In addition to this, the Labour Party has proposed an FoI law and is currently drafting proposals.

Robin Cook, Labour MP for Edinburgh Central, introduced a private member's Bill, the Official Information Bill, in protest at the White Paper. The Bill made substantial recommendations, including one which said that a department would only have 20 working

days to respond to an information request.

The public pressure campaign has been outspoken in its reaction to the White Paper. At an open meeting in the House of Commons after the release of the White Paper, Arthur Lewis, Labour MP for Newham North-west, and chairman of the all-party Parliamentary Committee for Freedom of Information and Privacy, told the large crowd that every person present

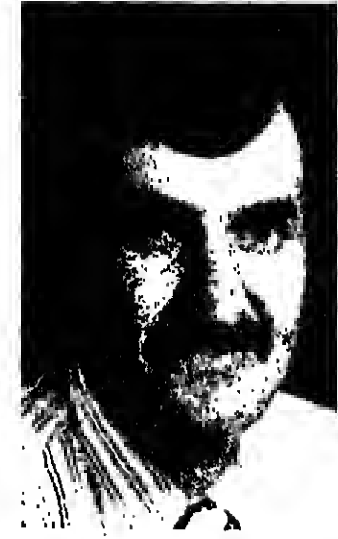
pounds on questionable projects and activities.

He felt that the cost would be of minimal importance compared to the long-range benefit to the country. A government that was accountable to its people, and knew that the money it was spending could be overseen by the public eye, would go a long way to distribute the tax dollar a lot more wisely than was currently being done.

The rapid development of the powerful new force of information technology has highlighted the growing value of information as a key factor in business, social and personal life.

Aspects of the information question include the free access to public information and the protection of an individual's private data — the issues of freedom of information and privacy. Freelance journalist TOM RILEY has recently come to the UK from Canada, where he has been a committed supporter of the freedom of information campaigns throughout the world.

Here Riley explains why UK campaigners are optimistic despite recent setbacks.



should canvas all the candidates in the next election to make freedom of information a major issue and to get every candidate's views known and published in the local press.

Leslie Chapman, author of the recently published book, *Your Disobedient Servant*, attacked the government for contending that the costs of the legislation might be prohibitive. He told the meeting that in his years as a Civil Servant he had witnessed the wasting of millions of

pressure. He pointed out that there were already over 200 Parliamentarians who supported this concept of access to government reports and documents.

The response to the committee's work has been excellent, and a lot of progress has been made since Lewis set up the All-Party Committee in April, 1975. The Freedom of Information Campaign sprung out of the All-Party Committee, as the former had been organised to develop support in the House of Commons and the House of Lords, but support from the public was so widespread that it necessitated the setting up of a second committee to organise the campaign properly and take advantage of the growing support.

The effects of the work of the two bodies have certainly been felt, as the whole of government secrecy — the right of the public to be truly informed of what its government is doing and why, and the right of an individual to know what is on his/her own personal file — has become a major issue in the media and with many other groups and individuals.

The TUC and the TUC-Labour Party Liaison Committee have passed resolutions calling for laws on freedom of information and privacy and have been joined by many others.

The government can only ignore the will of the people for so long before the electorate tires of it and throws it out at the polls. Proposition 13 in California in which the people voted for lowered property taxes and caused giant spending cutbacks, is one such example.

Things are definitely different in the UK and the government does move in a different way, but the ballot box is still there. It

could be that freedom of information is an issue which could bring about such a radical step as defeat at the polls, as more and more people become aware of the issue.

We are now moving rapidly into an Information Age. Consultant Adrian Norman, pointing this out in a speech at the open meeting in the House of Commons, said that he was of the opinion that "by the time we have an effective Freedom of Information Act we shall be an information society and an information economy."

It is recognised that information is power, and that he who controls the information controls the state — a precept known to any dictator.

Information is a major industry today. Its importance to the economy is reflected in the interest shown by people in the computer field who, aware of the great dangers implicit in the storage, retrieval, dissemination and other uses of information, take a keen interest in freedom of information.

The report of the Data Protection Committee's study is, therefore, anxiously awaited, as it will deal with the other side of the coin of FoI, one of equal importance: the protection of the individual, who today has vast amounts of data about him or her being stored and circulated.

It is expected that the report will recommend that individuals have access to their personal medical, credit-rating and similar files.

Whatever the outcome of any future studies or promises by the government (whether it be Labour or Conservative) it is certain that FoI advocates will continue their campaign with fervour and dedication.

'Personal' impact on the DP manager

JUST how much is the personal computer relevant to the DP manager? This question is likely to be asked more and more as the market for such equipment expands.

To provide a forum at which an answer may be found, Computer Weekly is collaborating with the Institute of Data Processing

Management in an evening meeting next month that will give an airing to the impact and trends of micro systems on data processing and DP management.

Taking part in the discussions will be a mainframe computer supplier, Dr Adrian Stokes of Langton Systems, and Computer

Weekly editor Malcolm Peltu, among others. It is also planned to have a display of personal computers on which interested parties can debate. Date for the forum is October 18, and the venue is the Imperial Hotel, Russell Square, London WC1. Starting time is 6pm. Non-members of the IDPM are welcome.

AMD allies with Zilog to enter 16-bit micro market

AS an ally in its entry to the advanced 16-bit microprocessor market, Zilog has pulled in Advanced Micro Devices. The Z8000 will be launched at the end of this year.

The two companies have signed a technical exchange and cross-licensing agreement specifically for the device and its peripheral and support circuits. It does not give Zilog rights to AMD's 2900 family 4-bit slice devices.

Under the terms of the agreement, AMD will become a second source for the processor, and will soon be receiving mask sets from Zilog, together with test and other relevant data.

In addition, the two will be jointly developing and mutually cross-licensing the peripheral and support circuits which the Z8000 will need.

Specific details of this part of

the deal have yet to be worked out, although Zilog has already started development work on some of the required parts, such as a memory management chip which is due for introduction early next year.

Each company will be responsible for the development of specific products, which will then be cross-licensed to the other company.

AMD has decided to go in with Zilog because, in the words of President Jerry Sanders, the Z8000 offers "the highest performance/cost ratio for the next generation CPU."

Both Sanders and Zilog president Federico Faggin express the view that the agreement will benefit future customers by developing a full range of peripheral circuits rapidly.

The Z8000 is claimed by the company to be the fastest 16-bit

micro that either is, or will be, available, certainly in the near future. Early comparison tests have indicated that its minimum instruction cycle beats that of the PDP-11/34 minicomputer, and that in program handling, it should be equivalent to a PDP-11/70 machine.

Pepe Piedra, European director of Zilog, says benchmark details should be available shortly to substantiate these claims.

An architectural outline of the part was given earlier this year by Phil Pitman, Northern European marketing manager, at a BCS microprocessor

specialist group meeting (CW, June 15).

He said the aim of the Z8000 design team has been to integrate the best attributes of the IBM 370 mainframe computer, and the PDP-11 minicomputer into the design of the new micro, while avoiding the architectural failings of these machines.

The device will be available in two versions. The first, a 40-pin package, will offer a direct addressing capability of 64K bytes. The second, in a 48-pin package, will extend the address capability up to 8Mbytes, using a memory segmentation technique.

Storage Technology issues disc drive challenge to IBM

A DISC drive with twice the capacity of the IBM 3350 and a charge coupled device memory offered as a direct alternative to the IBM 2305 fixed head disc drive are two products for IBM users being lined up by Storage Technology Corp.

STC's president, Jesse Awelwa, says the high capacity disc drive will be launched next June, and will have double the track density of the existing STC 8350, which is STC's direct alternative to the 317.5 Megabyte IBM 3350.

The charge coupled device memory is called FAM, Fast Access Memory, and will start to be shipped early next year. FAM has a capacity of 44 Megabytes and will be able to replace directly up to four 11 Megabyte IBM 2305 fixed head drives while offering a much faster access time — less than one millisecond — and costing a lot less, although the prices have yet to be announced.

The FAM is totally compatible with IBM operating software and "looks" exactly like a 2305 to the system. Awelwa pointed out that substantial orders have already been placed for FAM in the US, even though it is not formally launched yet.

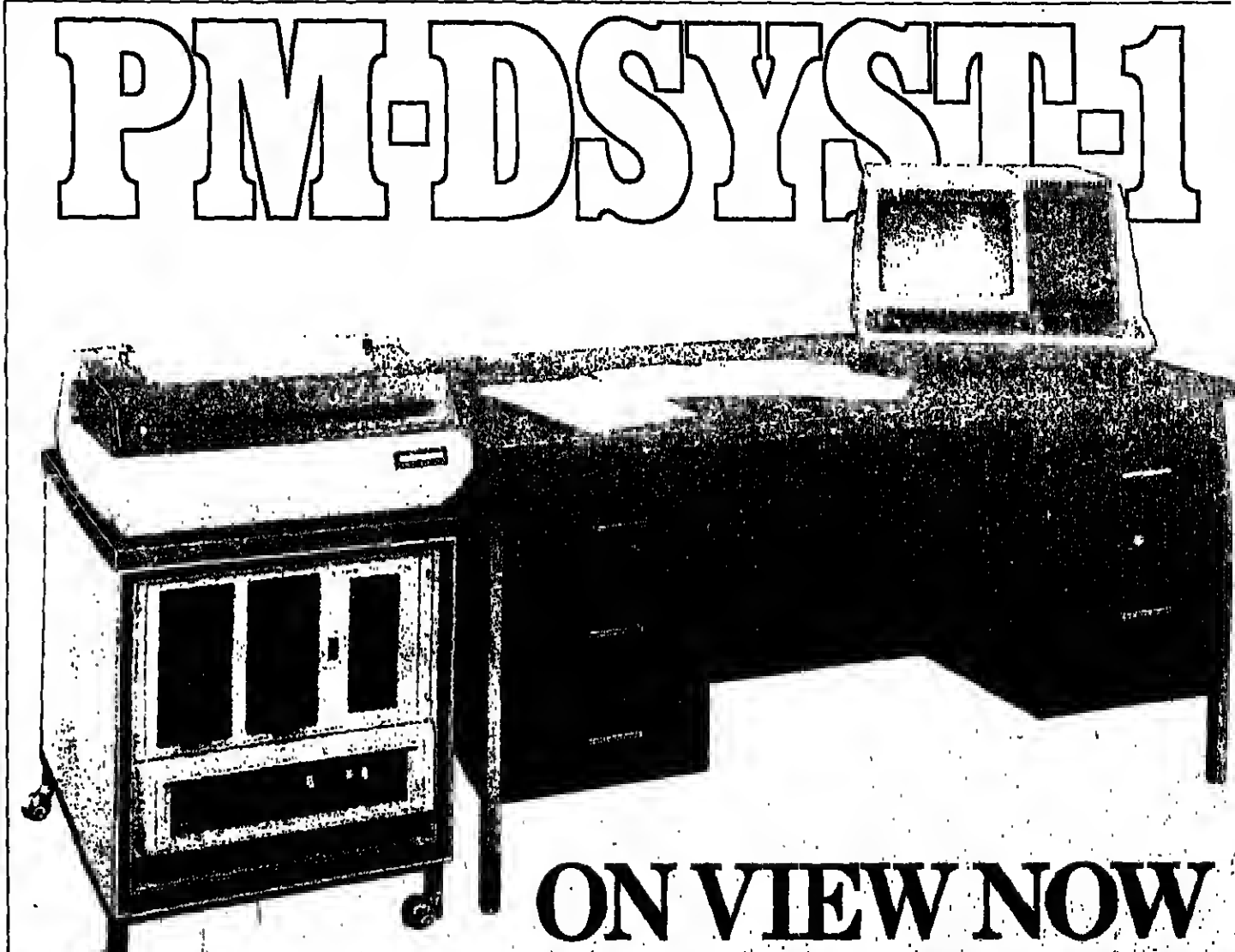
By early 1980 STC will start shipping an intelligent disc subsystem called VSS which will use a CCD buffer and a controller to "stage" data from disc into main memory. Awelwa sees VSS as a smaller but much faster version of the IBM 3850 mass storage system and feels sure that there is a much bigger market for VSS than for the 3850. It will cost a lot less than the 3850.

Awelwa left IBM in the late 1960s to found STC, and has built the company into the biggest supplier of tape drives in the world. He claims that STC now ships a higher volume of tape drives than IBM — a claim that IBM finds useful ammunition in its anti-trust duel with the US government.

STC now aims to achieve the same dominant position in the market for disc drives, according to Awelwa, and at the same time it hopes to increase the proportion of its business outside the US from the unusually low present level of 10% to 35%.

STC established a subsidiary in the UK earlier this year which is called Storage Technology Ltd, STL, to avoid confusion with the telecommunications manufacturer, STC.

TO combat the effects of the current shortage of suitably trained programming staff, the Edinburgh-based consultancy, Systems Consultants Ltd, has inaugurated a special course for newly-qualified graduates or the equivalent, covering all aspects of commercial computing and concentrating on the role in the market place of a commercial computer consultancy.



The Plessey Peripheral System PM-DSYST-1 is a family of enhanced DEC 320 compatible, general purpose, time shared, disc based computer systems specially designed for business applications. It uses Plessey commercial systems-001 disc resident operating system and can run all languages applicable to RT-11.

The basic PM-DSYST-1 package includes central processor with 64 K bytes of MOS memory in an attractive chassis • a 5 or 10 Megabyte dual disc system with one fixed and one removable cartridge • a video terminal or an impact printer terminal • the PCS-001 software package.

Equipment for system expansion includes additional cartridge disc storage up to 20 Megabytes • dual floppy disc units with 512 K bytes • 45 cps Daisy Wheel printer or a 300 LPM printer • various additional video terminals or hard copy terminals.

See it working for you.

To allow you first hand experience of this remarkable development, Plessey have arranged a series of "hands-on" demonstrations around the country.

Come along to the hotel which suits you and ask your questions, discuss your applications with the technical people, and see for yourself the simplicity of this advanced computer and its capacity for work.

If you know in advance that you will be coming to let us know. Telephone Mrs George Williams, 061 440 8426. Other sales offices will be very pleased to see you.

Wartime aerodrome to be site of ICL installation

THE site of the old Sergeant's Mess at the World War II West Malling Aerodrome is to be the home of one of the first implementations of ICL's new 2980-297X Common Storage Facility. The customer is Kent County Council, which is currently equipped with two ICL 1904S machines, and the £2 million order includes one of the new enhanced 2978 systems and a 2980.

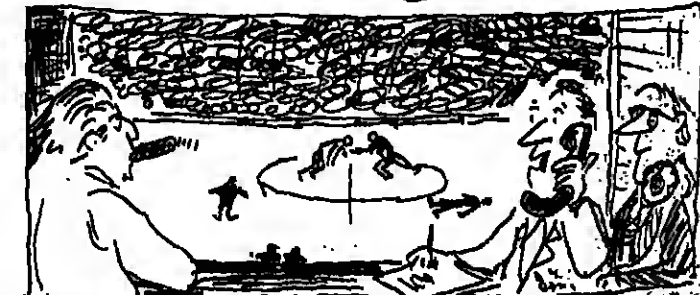
The Common Storage Facility enables users to switch stored access and store multiple access controllers, main memory and disc units between a 2980 order code processor and a new 2972 or 2976 order code processor (CW, July 13). This means that users with a large unconverted ICL 1900 workload can estimate their final configuration requirement for the 297X machine, buy a 2980 order code processor, and switch the memory and disc.

Spurred to action, VLI wins Chelsea derby

THE directors of the VLI computer services group are justifiably "over the moon" because they are to sponsor one of the top football games this season at Chelsea's Stamford Bridge ground, the London derby on November 18 with Spurs — the team spiced this season with a Latin American flavour.

There was hot competition with other potential sponsors for this game, but VLI won. And in return for a sponsorship sum adjacent to four digits, VLI will get its name on the programme, advertising space in front of the TV cameras (if there are any) and the opportunity to stage some special event.

"We have thought of ideas like issuing balloons for spectators, but have not decided on anything definite yet," VLI marketing director Anthony Lambie told me. Sponsorship for this game does have a touch of irony for VLI managing director Rupert Bayfield, who admits that Tottenham was his "first love" amongst London League clubs. Chelsea was converted to by a hard-running young team developed by Eddie McCreadie. But Bayfield is now firmly a



"Another recruitment contract, sir — from a Mr Brian Clough"

Chelsea fan and will be definitely on the side of the Blues. The Chelsea/Spurs game is only the tip of the blue iceberg as far as VLI's involvement with Chelsea this season is concerned. For the group, which includes the Computer People and Co-Operators recruitment and contract staff consultants and the SIL systems house, has also obtained possession of the most prestigious box in Chelsea's new East Stand. The group will also have the main advertising space on Chelsea's new electronic scoreboard (CW, July 27) and its name appears in the club programme as a "founding patron."

Despite Bayfield's support for Chelsea, the decision to become involved with the club was taken for hard-headed commercial reasons, according to Lambie, who is not personally interested in football. After meeting Chelsea's promotional manager, ex-striker Ian Hutchinson, the club facilities, which include a restaurant as well as the luxury boxes, that he felt was a useful way to spend some of the group's cash. VLI's first client is a strong regional roots in the North and Midlands (see page 11), the away teams playing at Stamford Bridge offer opportunities for entertainment with a strong local interest. VLI, however, denies plans to publish operations in the area.

Hotel Schedule		
Thursday 14th September	Edinburgh	George Hotel
Friday 15th September	Glasgow	Albany Hotel
Monday 18th September	Tyneside	Post House Hotel
Tuesday 19th September	Leeds	Metropole Hotel
Wednesday 20th September	Manchester	Grand Hotel
Thursday 21st September	Birmingham	Post House Hotel
Monday 25th September	Bristol (Avroton)	Ship Post House Hotel
Tuesday 26th September	Bristol	Great Western Hotel
Wednesday 27th September	Southampton	Post House Hotel
Thursday 28th September	London (West)	Elkington Hotel (Hendon)
Friday 29th September	London (Central)	Falmer Hotel

Equipment for system expansion includes additional cartridge disc storage up to 20 Megabytes • dual floppy disc units with 512 K bytes • 45 cps Daisy Wheel printer or a 300 LPM printer • various additional video terminals or hard copy terminals.

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GILB'S MYTHODOLOGY

Standards less important than standard of documentation



REMEMBER the chaotic Sixties? Beales and undocumentation programming. Many readers had not been born into the DP ranks then, but the history of the panic reactions to the situation can be traced. It can be in the current program documentation standards.

Admittedly some standardised order is preferable to low quality incomprehensible, un-commented assembler language programs. My point is that documentation should not be a goal in itself.

The real goal should be recognised clearly at the initiation of the work, and if the customary documentation techniques are more costly or less effective than the project requirements state, then the project team should be allowed, or even be required, to dump the standard in favour of some technology which meets project goals.

The one great advantage of forcing programmers and analysts to produce mountains of conventional written "maintenance" documentation is that nobody has to exercise professional ability in order to find a better alternative.

Tradition, the Fiddler on the Roof shouted in his song, and for some, mediocre results by tradition are preferable to excellent results by the exercise of some professional knowledge.

There are so many effective alternatives to the traditional program documentation available today, that I believe that there is some set of them which will always meet project goals better than any of the conventional program documentation methods.

tional program documentation methods.

I have touched upon some of the alternative technologies in earlier columns, and there are many more flooding our professional literature. The key to recognising the alternative or supplementary technologies is to think in terms of the maintainability cost ratio. How much maintenance ability and what what costs for development and during actual maintenance?

Any alternative technology is then compared to your conventional standard for program documentation in terms of how much it helps maintenance programmers understand programs, make changes and confirm their correct workings of those changes — without unseen side effects.

Cost, clock time, human effort and resulting reliability are factors to be evaluated here.

The conventional objection, that if we don't have a standard, then different people will not be able to understand the documentation, is not relevant.

One reason is that many of the replacements for conventional documentation are automatic aids for tracing errors or program workings, and they are not dependent on people who have learned a standard.

Another reason is that most of the alternatives are immediately obvious to any professional, and either more effective in maintenance work or a lot cheaper to implement. If they are better in these ways

then the fact they are different from convention is not relevant.

It is just an attempt to avoid necessary changes by management which is not doing its job of serious evaluation of potentially better techniques.

One of the most important trends in program documentation has been the effort to make the programs themselves far more readable. High level languages, modularisation, structuring, indentation and comments all contribute. The old crutch is no longer necessary, but it persists due to organisational momentum.

Other trends are in automated evaluation techniques such as distinct software, where the documentation is expressed in an executable program for direct comparison; and in extensive file analysis or database diagnosis programs, which identify errors or side-effects from maintenance change.

An extensive list of automated aids was published in the IEEE "Computer" July, 1977, and many of the more recent ones are discussed at length in my Software Metrics book.

Gilb's Hypothesis: Most of our currently common documentation techniques for program maintenance can now be replaced by more effective technology. The reason is mainly that the cost relationship of people and machines has changed dramatically since they were developed; more automation is needed.

SOFTWARE FILE-1

Time sharing operating system from Shade for Interdata 16-bit minis

A TIME SHARING operating system for Interdata 16-bit minicomputers has been developed by Shade (Computer Services) of Calne, Wiltshire. The software, MTX, is fully compatible with Interdata's DOS R04 operating system and can support up to 15 user terminals. Targeted particularly at existing DOS users, the system offers a convenient path to multi-user operation, notes the company, without involving either file conversion or changes in system command language. A 64K byte machine running under MTX would typically be used to support three or four concurrent users, according to Shade.

Memory requirements for the operating system are around 18K, though depend partly on this configuration. A further 245 byte control area is required in each partition.

The remaining memory is allocated by the user at switch-on, using MTX commands which define the number of partitions and their size.

In the support of multi-user activity, the system in some cases permits code sharing, by providing for re-entrant program execution. One such instance is the Basic Interpreter. The company has implemented Interdata's R03 interpreter as a pseudo extension to MTX, so that all partitions can access the same copy.

Re-entrance is also supported for some library functions and work is currently under way on adapting Interdata's Fortran run-time library to make it re-entrant.

Although compatible with DOS system command language, MTX in some areas offers extension, such as a macro facility. The system also supports printer and plotter spooling, up to 18 accounting codes per user, password protection of user files, and facilities for broadcasting from the system console.

If implemented on a machine including a real-time clock, the software allocates each user a 30 ms slot. However, the system will also operate in event-driven mode where a clock is not present.

MTX is priced at £1,700, including one year's warranty. Subsequently, there is an annual maintenance charge of £200. Future development of MTX, originally commissioned by an undisclosed customer, could include a version for the 256K Interdata 8/18E. Currently under evaluation, this software would provide six user partitions, each of 32K.

Shade, which has extensive experience of the Interdata range, was previously best known for its DOS-compatible Impos multi-tasking operating system (Software File, March 18, 1976). Over 20 of these have now been installed.

A CHANCE to jump the gun on Fortran 77 in respect of character string handling, is provided by a set of functions developed by Software 70 of Anaheim, California.

The package, String70, provides callable Fortran IV subroutines for operating on variable length character strings, both individually and in tables.

Manipulation possible with the software include string comparisons, string moving, and string searches, the latter allowing for multiple occurrences of the search argument in the string being searched.

Facilities are also provided for string deletion (ie substring deletion followed by compression), string insertion (ie substring insertion followed by concatenation) and string replacement.

File handling functions include table creation, binary search, entry insertion, and entry deletion.

String70 occupies less than 1K bytes of memory and is supplied as a sequenced source deck together with a source listing and users guide.

It is priced in the US at \$70.

Misam file handler updated

A FILE maintenance system and a text editor have been added by Filetab Support Services in the latest version of its Misam DEC PDP-11 file handler.

A systems programming facility, File Maintenance System, allows the user to create or maintain both Misam-indexed data files and any data file indexed by logical record number. Written in Basic Plus, it is claimed by the company to reduce greatly systems design and programming time for file maintenance.

Also included in Misam Mk2 is Teds, a text editor running under RSTS/E. Teds may be used both for editing formatted Ascl files and for managing program source files in Basic or RPL.

Misam, a multi-index, multi-key access method which runs under RSTS/E on PDP-11s, was originally developed by a Canadian systems house. The new version was partially developed in the UK by Filetab Support Services, which recently released RPL, a decision-table based language for the PDP-11 (Software File, July 27).

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SOFTWARE FILE -2

London venue for Euro/US conference

A JOINT European/US conference on software management is to be held in London in October. Recent US Department of Defense initiatives will be a major theme of the conference, which will also review progress in software technology and actual project experience.

Particular areas of concern will include common high order language projects, such as Ironman, under way in the US and Germany, and recent EEC moves on software portability (CEV, August 10). Specific technical topics to be covered include life cycle costing, software verification, and validation, project auditing standards, and requirements specification languages.

There will also be presentations on software management experience in the European Space Agency and the development of Command and Control systems for Nato.

The conference, the third in an annual series, is organised by State of the Art Ltd, Victoria House, Suite 501, Southampton Row, London WC1. 01-242 4045.

SIR goes into SIA

A DATABASE management system which interfaces directly with the widely-used SPSS program for statistical analysis has been installed by the London bureau SIA. The system, SIR (Scientific Information Retrieval), provides users with an integrated tool for data organisation, storage, and analysis.

SIR, which also interfaces with the BDMP suite, supports hierarchical data structures. A simple command language provides facilities for hierarchy manipulation, report generation, and file security control.

The system, which operates in either batch or interactive mode, also allows the user to extract subsets of the database and store them in SPSS SAVE files. This provides an economical way of analysing data subsets, without having to write a special extraction program.

Bradford graphics package offered free to other universities

A GRAPHICS package developed at the University of Bradford is to be offered free to other universities under a sharing agreement, and has already been installed by the University of Manchester Regional Computer Centre.

Called Simpleplot, the software provides facilities for plotting two-dimensional and three-dimensional graphs and is particularly intended for use by engineers and scientists.

The package, written in Fortran, will also be made available to industrial and commercial users. Initially through the Bradford University Industrial Liaison Office.

Simpleplot has been in use at Bradford University for nearly five years and has been implemented on ICL 2900, CDC 7600, and DEC PDP-10 systems. A version for IBM 360/370 equipment is under development.

The software consists of a set of subroutines for each component of the plotting process, from drawing and labelling axes and keys to drawing either smooth or broken curves through a set of points.

A feature of the package is the close relationship between these instructions and the steps involved in producing graphs manually. The non-specialist user.

At the same time, it can produce a wide range of high-quality graphs. In addition to plotting histograms, contour graphs, and hidden-line surface drawings, it can handle linear, logarithmic, or polar axes and Smith charts.

Extra capacity for your mainframe

If you are finding that the capacity of your mainframe computer is limited then perhaps you can provide the answer. Instead of replacing your mainframe with a more costly alternative solution could be to add a local NORD computer system. Extra capacity can be added to suit your own particular requirements.

What is more, the NORD system can while performing local processing act as a remote terminal offering simultaneous communication with most machines: IBM, UNIVAC etc.

NORD computer systems are used in industry, commerce, research and education throughout Europe.

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MoD orders Mascot kernel for use on F100-L

THE Ministry of Defence has commissioned the development of a Mascot kernel for use on the Ferranti F100-L microprocessor. The contract, placed with Y-Ard of Glasgow, calls for delivery of an initial version of the software by the end of the year.

At the same time, the expected first application for the software neatly demonstrates the Ministry's aim of achieving application system portability through the use of Mascot, which is understood to be under consideration as a standard for real time defence computing (CW, August 10).

To be written in Coral 86, the real time executive will provide for the scheduling of concurrent application tasks or, in Mascot terminology, activities.

It will also provide facilities for peripheral interfacing notably a serial line handler and a DMA handler, and an interface to a real time clock.

The kernel is intended particularly for memory resident applications, where no backing store is available. The typical application environment envisaged is that of a distributed control system, in which each processor will hold a minimum, stripped-down, software configuration.

However, the kernel will also be configurable in development versions, for running either on a standard F100-L development system, or on a hosted software development system.

The facilities provided, for example for error reporting and monitoring, will thus have varying complexity, depending on the configuration of the system to user requirements.

Y-Ard has already developed, and applied to the MoD, a Mascot kernel for the Intel 8080 microprocessor. The new executive will use the processor-independent portions of the existing kernel, according to a spokesman for the company, and its development will involve writing supplementary software

special to the F100-L.

The first application, he said, was likely to be in a distributed control system for ship power plants. This was currently based on 8080a, but the MoD was keen to replace some of these with Ferranti processors.

The size of the executive could not yet be determined in detail but would depend very much on the efficiency of Ferranti's Coral compiler for the F100-L, the spokesman noted.

PROGRAMMER NOTES

Have Cobol, will travel

As he pointed out, there are failures on both sides in developing computing as a long-term career.

Programmers tend to be more loyal to their subject specialisation than to their career within a particular company or user industry.

Others in the industry would go further than Benjamin in suggesting that too many young programmers, having landed in a scene with an overwhelming number of vacancies, good money and a generally easy life, have found it all too easy to drift from one job to another without ever really taking responsibility for seeing projects through.

The accuracy of skills people, burgeoning new projects and computer applications, and a certain indication by management from tackling the tricky problem of managing the highly articulate and often temperamental programming community, have helped to build up a wide market for contract staff.

Although the nature of many computer implementations, with peaks and troughs, would inevitably create such a requirement, it is all too easy for young people to drift into contract work for a number of years of easy, non-responsibility living.

This still does not answer the question of where the programmers go when they grow older.

Having Cobol PL/I or Fortran is still sufficient armoury to enable a programmer to survive and prosper doing his or her "own thing", and there are sufficient job vacancies to enable any programmer wishing to settle to find a cosy niche.

But is there sufficient commitment from programmers to their career/profession which has given them such a good start in working life?

COMPUTER WEEKLY/IDPM WORKSHOP

Computer Weekly in association with the Institute of Data Processing Management present

Successful User Relations

A PRACTICAL WORKSHOP ON EFFECTIVE COMMUNICATION BETWEEN THE DATA PROCESSING DEPARTMENT AND THE USERS

Tuesday, October 17, 1978, at the Holiday Inn, London

Because DP is a service function, it depends on its users for ultimate success. But users from the Board to the shop floor differ in needs and outlooks and as they grow in power and numbers their attitudes can make or break the fortunes of DP.

This practical workshop, to be run by Nigel Laurie of Communications Audit, will help delegates to discover the techniques and approaches that work best in helping to manage successful user relations. The workshop is practical and based on experience. Above all it is participative so that delegates can put the theory into practice. A summary of a survey conducted at a previous Nigel Laurie workshop on this subject was published in Computer Weekly on May 25.

For this latest workshop the number of participants will be limited in order that the maximum benefit may be achieved. If you would like to reserve a place please complete the application form and return it to the address shown, not to Computer Weekly on the IDPM. A brochure giving further information about the workshop may be had from Nigel Laurie, 40 Bowling Green Lane, London EC1A 3BE. Tel: 01-437 3836.

To: Conference Administrator, IPC Business and Industrial Training, Surrey House, Throley Way, Sutton, Surrey SM1 4QQ. Telephone: 01-643 8040

Please reserve a place for the Successful User Relations Workshop to be held at the Holiday Inn, George Street, London on Tuesday, October 17, 1978. The fee is £50 (plus VAT £4) for members of the IDPM. It is £45 (plus VAT £3.80). This covers attendance at the workshop, coffee, lunch, and tea and full course documentation.

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Elastic-plastic analysis

FOLLOWING the takeover of Electronic Calculus Ltd, University Computing Company has added to its inventory a series of ECL-developed programs for elastic-plastic structural analysis and design.

The plastic analysis system is advocated in the draft of the new Code of Practice for steel-framed buildings BS.20, and is being used increasingly in the construction industry.

The ECL system, PLSTIC, uses the direct stiffness method and performs elastic-plastic analysis on two-dimensional frames of any shape.

THIS tracing problem, calling for nine dots to be joined with four consecutive strokes (with-out lifting pencil from paper), is out of lifting pencil from paper, is one of the early classics of recreational mathematics. Since then, analysts have been carried out on many larger sets.

This week's problem is to join the 25 dots of a 5 x 5 grid with only eight consecutive strokes. See page 53 for solution.

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How did you find your first job?

TO SUCCEED as a computer operator, a person needs to have a considerable number of qualities. These include the ability to understand and use the operating system; the fitness to cope with the demands of shift work; and the sense of responsibility necessary to work unsupervised.

So where do companies find the people who possess these attributes or, more to the point, just how do operators get into operations?

Of course, we have the trade papers, such as *Computer Weekly*, which advertise jobs in abundance. But the great problem is that potential budding operators are often unaware that such publications exist.

Potential entrants are in a vulnerable position because they rarely know what the work is likely to entail; all they are aware of is that it is to do with computers and, therefore, will have good career prospects. Hence their enthusiasm often leads them to accept the first position offered.

However, there are two government-sponsored schemes which are of considerable value in this context. These are the Training Opportunities Scheme, TOPS, and the Threshold Scheme organised by the National Computing Centre.

Both of these are good because they have syllabuses which are of considerable value in this context. These are the Training Opportunities Scheme, TOPS, and the Threshold Scheme organised by the National Computing Centre.

Op Spot would like to hear your views on recruitment. How did you enter operations and does it live up to your hopes?

PO careers must be structured

POST Office plans for increasing its dependence on the larger ICL mainframes and introducing minicomputers on a broad scale must be accompanied by greater career progression opportunities for the operators whose jobs may be placed in jeopardy.

This message came across loud and clear in an interview with Charlie Addiman, who is secretary of the Data Processing Service Branch of the Society of Civil and Public Servants. The branch represents some 1,300 senior operations and project staff in the Post Office.

In theory, it is possible for Post Office operations staff to transfer into programming positions, and vice versa, but in practice this rarely happens, says Addiman.

At the last quarterly meeting of the branch committee this was one of the matters discussed, and the union brought this to the attention of the Post Office management. In response, a circular was sent out to employees stating that certain positions in software support are open to both operations and programming staff.

Said Addiman, "This is fair, because operators are just as qualified as programmers for positions in software support. In fact, operations experience would probably provide a better grounding in this respect."

Members of the union and Post Office management have formed a committee with a view to providing more formal training for the operations staff.

"Union members on the committee have suggested that the operators are sent on a basic programming appreciation course. We believe that this should be followed by one on Cobol."



ADDIMAN

The union is waiting for the management's reaction to this and will follow it up with other suggestions.

Although he is quite satisfied with the progress made so far, Addiman can foresee difficulties for some of the operators who wish to move into the areas of systems and programming.

"Geographical considerations come into play," he said. "At the Edinburgh site, for instance, we do not have systems and programming sections, so if the operators want to move into those disciplines they may well have to relocate to London."

He disagrees vehemently with those who argue that operators require little skill or expertise. "I am not saying that the Post Office holds this view, but it does seem to prevail throughout the computing industry."

Addiman points out that, by the very nature of their work, senior operations staff are often put in positions where decisions have to be made. This, he argues, is good management training.

"When it comes to management, who is going to come off best — a guy who has been in

charge of a night shift, or someone who has come from systems or programming?"

"The shift leaders at our large sites are used to shouldering a lot of responsibility. This experience must be used."

Post Office sites at Derby, Edinburgh, and the Barbican in London already have ICL 2900s installed and Addiman had this comment to make:

"These systems are supposed to require far fewer operators than the machines previously used, but we do not wholly agree with this view. We base our estimations on our own research into the matter and do not rely upon the facts and figures supplied to the Post Office by the manufacturer of the equipment."

Of course, any Post Office activity which directly affects its members is of concern to the union. And he was keen to stress "Portsmouth, St Albans and Kensington are three sites which have been in danger of closure in the past. Now, however, we are much more optimistic about their future."

According to Addiman, the introduction of minicomputer systems at its philatelic bureau in Edinburgh. At present the bureau's computing needs are catered for by the Leeds installation.

The union is not against the use of minicomputers as such, providing they are used on the same premises as the machines they replace and operated by the same staff. "We would not stand in the way of progress just for the sake of it. However, great attention must be paid to the operators whose careers may be affected by it."

In fact, he considers that minicomputers will affect operators in the Post Office far less than they will affect those employed by other concerns.

Language range wins varsity order for Nord

LOOKING for an expandable minicomputer system with a wide range of language compilers to equip its new department of computer science, Exeter University has settled on a Nord-10/S system from Norsk Data of Norway.

Language compilers available on the Nord-10 include Coral 60, Lisp, Simula, SCPL, Pascal and the Nord process control language, as well as the usual Fortran, Cobol, Basic and RPG-11. The computer is to be used for teaching and for the study of languages and compilers.

Priced at under £35,000, the Nord-10/S configuration was chosen in preference to a number of offerings from companies which included DEC, Prime and Interdata.

Strengths of the Nord lie in-

clude the powerful multi-purpose Sincra III operating system, which runs on all models in the line. "We had to know that starting off from a small configuration our installation could grow into one much larger," comments Professor Campbell of Exeter.

Due to be installed in October, the Nord-10/S will be supported by Norsk Data's UK agent, Nicholas Norton (Nord) Ltd of London. It will initially support eight terminals.

First half figures from Norsk Data show turnover up 40% at £2 million Norwegian Krona (about £8.2 million) compared with the same period last year. Exports accounted for 40% of output. Following the opening of a Paris office earlier this year, a German office is to be opened this month.

Doctors call for new law to safeguard records

CONCERN over the privacy safeguards relating to the child health databank proposed by the Department of Health and Social Security (CW, May 4) has led doctors to call for new legislation which would make it illegal for unauthorised persons to reveal the contents of medical records.

Dr Michael Thomas, of the Central Ethical Committee of the British Medical Association, which is lobbying for stricter control over the confidentiality of medical records, told *Computer Weekly*, "We are concerned that in a centralised national databank of medical information there would, under present law, be no legal safeguards to prevent sensitive facts about individuals being revealed by clerks with access to the files."

"We would like to see a law which makes it illegal to reveal not only the contents of an individual's record, but the fact that it actually exists. This would operate in a similar way

to the Wireless Telegraphy Act, which makes it illegal for Post Office staff to reveal either the contents of a telegram or the fact that one has been sent by a particular person."

"Doctors are not necessarily against the use of computers in principle," said Dr Thomas. "In fact we believe that computers are the only practical way of storing and accessing large amounts of medical data. But we must ensure that any new system is the most appropriate to our needs, and does not in any way endanger the personal relationship between doctor and patient."

The BMA Central Ethical Committee is particularly worried that the proposed DHSS child health system is to be implemented on an existing batch system. The doctors believe that only a real time system with effective password controls could offer adequate data security.

Office challenge

From front page

IBM is also believed to be developing an advanced facsimile device and some observers believe the ink jet printer available with the Office System 6, which uses a micro chip to control the printer typeface, could also be used for graphical output. IBM is also understood to have planned a large order with Paradyne for 4800 hps modems which could be used as part of an electronic mail advanced communications network.

Another important facility provided by TRS is telex network interfacing which enables documents generated on System 8 workstations to be converted automatically to telex code.

IBM has been supplying telex message switching based on its System 7 minicomputer, for some time.

TRS was developed by IBM in the UK and is likely to be shown for the first time in public at the Sloch exhibition in Paris from September 20/25.

Growing market

THE large potential market for automated office systems has been highlighted in a report from the International Data Corporation* which highlights the growth of total office systems including the intelligent copier (CW, August 24), facsimile and other forms of text input and output.

The report, compiled before the IBM announcement of text routing systems (see page 1), highlighted IBM's failure to attack seriously the shared logic market and says that the word processing market is still "unsaturated" despite IBM's commitment to word processing in general and its dominance of the stand-alone word processing market in which, IDC estimates, IBM has over 250,000 units worldwide compared to its nearest rival, Xerox, with an installed base of only about 16,000.

The report stresses that there is increased interest in Optical Character Reading equipment for use in conjunction with word processors now that paper cost of low reliability and higher cost of OCR have been overcome. An area that may prove to be most lucrative, according to the report, is that of electronic mail/fax transmission systems.

"The success of electronic mail depends heavily on the replacement of paper by electronic communications costs," says the report. "If the cost of satellite communications in particular drops in coming years, the future of electronic mail is bright."

*Word Processing and Related Markets is published by International Data Corporation, 2000 36th Street, San Francisco, California 94114. The price for a hard copy is \$12.50.

Avebury warns of dangers to society

WIDESPREAD provision of videodata terminals in public places could be one way of preventing the use of computers leading to grave social divisions, Lord Avebury told a group of young people last week at the Australian Computer Conference.

As well as criticising unions for not giving a more effective lead in the progress towards a "more leisureed society" (see front page), Lord Avebury also said he believed that the market for micro-based personal computers was more limited than many envisaged, although he saw growing prospects for the use of micro as "business systems" in the home and for the smaller business. The home and office prospects for videodata services were also great, he predicted, with far-reaching effects, although the ultimate potential of videodata was difficult to evaluate at this stage.

In addition to the problems of social disruption caused by unemployment, Lord Avebury warned that variations in the ease of access to computer-housed information could lead to grave social divisions. "Just as the middle classes take better advantage of public services like health care or libraries because of their attitude to state and local authority benefits and their relatively good knowledge of them, so the same groups in society will be quickest to see the merits of participating in the

information revolution, and mapping out for themselves the best way of doing it," he pointed out.

To prevent conflict arising from this state of affairs, he advocated the widespread provision of videodata terminals in public places such as libraries and post offices, together with advice and guidance on to use them. Citizens could log on to a videodata terminal and get the whole range of services, together with local information about schools, recreational facilities, housing and shops.

Lord Avebury said he saw improved prospects for the smaller business coming from the arrival of cheap but powerful mini-computer-based systems together with the availability of reasonably priced text processing devices.

"Hitherto the benefits of computing have been restricted to the larger companies which could justify the substantial capital investment required," he said. "That gave the edge in competition to the bigger enterprises, and it has been one of the reasons for the emergence of huge corporations that dwarf many newly independent countries."

The development of text processors, he said, would bring about a huge decrease in the demand for clerical workers such as secretaries, typists and filing clerks, and he predicted that the growth of the electronic

exchange of messages would eventually make it as expensive to send a hard copy letter as it is to send a telegram today. The use of paper in offices would plummet, and the era of the huge multi-storey office block would come to an end.

He pointed out that the indirect effects of computers could be of greater importance than the direct ones. In particular, these included the increased power of the military in the superpowers, the social influence of policy decisions based on computer-run mathematical models, and the discouragement of non-conformist thinking in a society dependent on the computer for many everyday functions.

Rightly used, however, the computer offered the opportunity for a tremendous enhancement of the quality of life, and of the power of the individual. "The route we take and the destination we arrive at," said Lord Avebury, "are still for the human race to choose."

Not just a pretty face...

A NEW marketing campaign from communications specialists Case of Rickmansworth starts next week, featuring one of the most familiar faces in the computer Press, Liz Ross.

Under the heading "The Case alternative," Liz has been appearing in modern advertisements over the past year, with an invitation to phone her at Rickmansworth. But Liz is not just a photographic model; she is a product marketing specialist at Case who has an honours degree in industrial engineering and speaks fluent French and Spanish.

Liz joined Case in 1975 as an export marketing administrator. When she was appointed to her current product marketing job, she was asked to handle the phone-in campaign and, according to Case marketing director Christine Stott, it seemed a logical step to use Liz in the adverts.



Sporting a new hairstyle, Liz Ross will be eagerly awaiting maildrop phone calls. Plans to dangle her from a perch to make the point graphically have, we think, been dropped...

"Computer Weekly", "Data Processing" and "Systems International" present

COMPEC'78

Britain's major peripherals and systems exhibition
Olympia, London, December 5, 6 and 7

10 am to 6 pm (closing at 4.30 pm on the last day)

Now in its eighth year, Compec is bigger than ever in its new venue and features a wide choice of computer peripherals, small business systems and mini and microcomputers. Here are some of the 200 exhibitors:-

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Vanguard Electronics
Wang Electronics
Wang UK
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Willis Computer Supplies
X-Data
Zygal Dynamics |
|---|---|--|

HINT OF THE WEEK Modifying the printer

MODIFYING printers in the IBM OS/VS1 environment is the subject of a technical hint sent by Richard Post, an operator at the Nottingham site of the East Midlands Electricity Board.

Post says, "In accordance with our installation standards, we give special forms a four-digit alpha-beta code — four digits being the maximum allowed on the JCL OUTLIM parameter."

Now if a programmer at the site wishes to use a new print format on plain stationery, the codes 1115 and 1116 are the operators of the carriage loop to be used by means of his cue card.

However, complications arise when the job concerned has several steps, with each producing output of a different format and therefore requiring several loops.

He continues, "The problem is that the system knows the cor-

VDU operators 'need regular eye tests'

SOME experts consider that as many as 33% of the employee population have visual defects which are completely untreated, or inadequately so. Using VDUs, therefore tends to affect both their visual and general comfort. VDU operators should be given the appropriate eye tests on selection and, if necessary, fitted with spectacles. In addition, tests should be carried out regularly.

These are two of the points highlighted in a report by Rachel Bimbaum, an ergonomist at the London School of Hygiene and Tropical Medicine, entitled *The Health Hazards of Visual Display Units*.

The report goes on to stress that persons suffering from cataract should never use the units, and that those who wear bi-focal spectacles are unadvisable as they would have to adopt a posture conducive to fatigue.

It points to the direct relationship between eyestrain and the flicker, glare, reflections and varying brightness of the units.

It states that eyestrain is also made worse by personal factors such as general fatigue, ill-health, the use of certain drugs, light-sensitivity and a nervous disposition.

In the normal course of events, there is a lapse between the input of commands or data and the response given by the

system. Rather than giving the operator a chance to rest, this leads to stress as he must remain alert in order not to miss the data displayed.

When overburdened in this manner, VDU operators often complain of stress-fatigue symptoms, including depression, weariness and exhaustion. They also display less efficiency.

In conclusion, the report puts forward some suggestions. They include:

VDU operators should be given regular eyesight check-ups, which should be carried out during their normal working day to produce valid results.

All operators should have regular breaks from the units. Efforts should be made to ensure that the units are not placed against or facing a window, if they must be sited in the vicinity of a window, then the screen must be placed at an angle to it in order to reduce glare and reflections.

In recent weeks, several readers have contacted me about the course of the Institute of Ophthalmology in London on October 12 and 13 (CW, February 23).

According to Veronica Reading, who is a lecturer in the Department of Visual Science at the Institute, the course is now fully booked, but another is planned for next year.

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Finke to head DG operations in Europe

EUROPEAN operations of Data General will now be headed by Jim Finke, who has been appointed vice-president and general manager of Data General Europe. He succeeds Barry Fildman, who returns to corporate HQ in Westboro, Massachusetts to fill the newly created position of vice-president of marketing, Americas/Far East. Finke's previous job was that of

general manager of international operations with the medical systems division of the US General Electric. Before that he was with Motorola, where he held several positions in international and European operations, and most recently was director of international operations, semiconductor division. Fildman has been vice-president of Data General Europe since 1973.

Roger Tagg, John White and Eric Cook, management consultants with Scicon, have taken on new responsibilities. Tagg, who has been the company's senior consultant in the database area for several years, takes charge of the consultancy and IR business. White, who has been leading a data management project, takes over the implementation side and data management in the field of defence. Cook, who leads the management consultancy team, takes on additional responsibility for the data management group.

Joining the group from Cincon Systems, where he was a project leader/consultant, is David Dent, who will be a consultant. Neil Bar-

on, who was a technical officer in the British Museum's research lab, has joined Scicon as a senior analyst/programmer, and Timothy Foxon, a senior systems analyst from Rolls Royce, becomes an analyst/programmer with Scicon. Rod Gunn joins the support team from IDMS as a consultant.

Patrik Bransfield and Peter Finer have been appointed directors of Pritchard Brown and Taylor. Bransfield, previously chief accountant and company secretary, is financial director; Finer, whose title is now sales director, remains head of all hoc surveys.



Forbas

Croft

Clacher

Hickman

Ian Forbes has been appointed by Jacques Systems of High Wycombe, Bucks, as its European marketing executive, to be responsible for establishing and supporting distributors of the company's range of video computers in Europe. He was previously divisional manager of the packaging department of CZA, a firm of management consultants in market research in Europe.

Susan Croft has been appointed marketing support manager with Advanced Computer Techniques Corp. ACT, in New York. Her previous job was as PR executive with ICL's American subsidiary.

Ken Baynton has joined Borer Electronics as technical sales support manager. Previously he was UK engineering manager with Rael-Milgo. Dave Dye, a former computer peripherals sales engineer from Ampex, has become senior sales engineer with Borer. Doug Prewer, who was a Post Office engineer, has joined Borer as a field service engineer.

Sales administrator is Sheila Thomas, formerly in sales at Ross Foods; Ann Tuffley, previously secretary/PA to the sales team at Ampex, has joined the Borer team in the same capacity.

Quite a few appointments have been made at Rediffon Computers. Richard Hickman, having rejoined the company in December 77 as territory manager has now been made senior territory manager for the London branch. He was with Rediffon from 71 to 74 and from July 74 to December 77, he was with CTR.

Ken Brownman has been appointed territory manager for the southern branch and will be based at Stowmarket. He was previously a sales executive within the company. Another appointment at Rediffon is that of Phil Sartorius as customer services engineer for the South West branch. He has been with the company in a similar capacity since August 76. Also to join Rediffon is Sue Clacher as a senior systems analyst. She was previously an operational research analyst with BP Chemicals.

Bo Briggs of Marconi Instruments has been appointed sales director, until recently he was general sales manager.

Tom Edwards, formerly marketing manager of Dataplex, has been appointed territory manager, word processing systems with General Computer Systems UK.

DIARY

SEPTEMBER 11-12

Non-invasive cardiovascular measurements conference. NASA/Stanford University, Stanford, California.

SEPTEMBER 12

Computer programs for project control, seminar. Association of Project Managers, Waldorf Hotel, London WC2 1000. Details AFM, 01-789 3182. Computers and the unions. Clive Jenkins, BCS 1978 Lecture Series, London School of Economics, London WC2 1930. How do we use IT - how to monitor and control the day in day running of the system. Albert Stacey, BCS Group for New or Potential Users, Royal Angus Hotel, Birmingham, 1400.

SEPTEMBER 12-14

Computers in cardiology conference. IEEE/Stanford University etc, Stanford, California.

SEPTEMBER 13

Meeting, CMC Users' Association (CUMAC), 117 Ltd, Saxon Hotel, Uxbridge, Essex. 10.30. Details: Maldenhead 28525. Nascam 1. Alan Tait, Association of Independent Computer Specialists, National Liberal Club, London SW1 1800.

Solveware house, friend or foe. Vir Groves, BCS Leeds branch, Park View Hotel, Leeds. 18.30.

SEPTEMBER 13-14

Scottish Group meeting, IIM Computer Users Association, Emerson Hotel, Edinburgh. Details Mrs Spence, 01-551 1643.

SEPTEMBER 13-18

Very Large Scale Integration conference. IEEE Computer Society/ACM/SMIS, Berlin.

SEPTEMBER 16-22

Jackson design to happen, working Martin Bromberg, Dept of Computer Science, University of Strathclyde, Glasgow. 9.30. Details from the Continuing Education Office at the University of 011 552 1400, ext 2132.

SEPTEMBER 19

Getting cost control accepted, seminar Association of Project Managers, Waldorf Hotel, London WC2 1000. Details AFM, 01-789 3182.

Performance evaluation. Prof B. Smith, BCS, Reading branch, Copper Inn, Pangloss, 20.00.

SEPTEMBER 19-21

CAI '81, computer-aided design manufacturing conference and exhibition. Computer and Automation Systems Association, Los Angeles.

SEPTEMBER 20

VME/286 workshop meeting, 2000 User Group, National Liberal Club, London SW1 1800.

SEPTEMBER 20-21

Micro software, Dick Waller, OPA Essex branch, County Hotel, Rainford Road, Cheshire, 20.00.

SEPTEMBER 20-21

Local Authorities Group meeting, IBM Computer Users' Association, Central Regional Council, Striling, Ostia M. Specialist, 01-551 1643.

SEPTEMBER 21-23

Telecommunications - convergence of technologies. Derek Brooks, BCS London branch, Waldorf Hotel, Aldwych, London, WC2 1800.

SEPTEMBER 21-23

Symposium on interactive techniques in computer-aided design. IEEE Computer Society, Bologna, Italy.

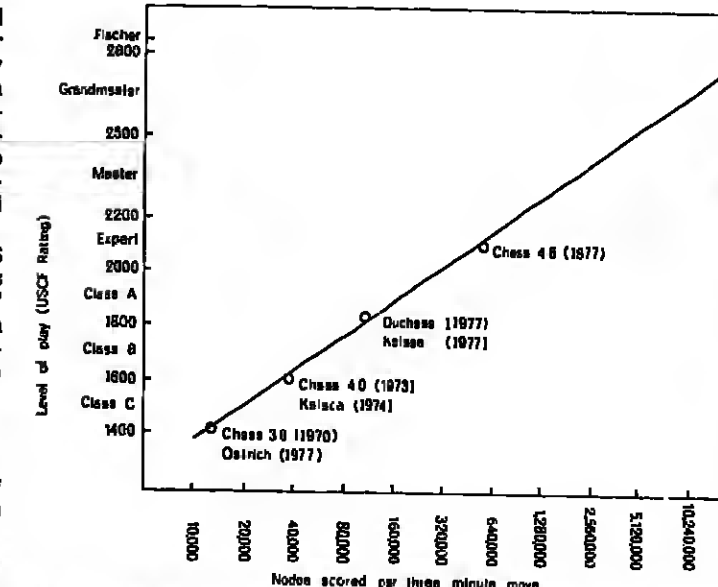


IN the immediate aftermath of Levy's victory over Chess 4.7, it is natural to ask, "When will a computer program beat not just David Levy but the chess champion of the world?" Provided that basic program designs for chess-playing remain roughly similar to those of today, an answer of a sort can be constructed from the chart reproduced here, which I owe to Monty Newborn, author of Ost-rich and chairman of McGill University's Computer Science.

Program strengths in US Chess Federation rating units are plotted against "brute force" search capabilities expressed on a logarithmic scale. A surprisingly good approximation to a straight-line relation emerges. If we were to extrapolate on this scale we would conclude that the world chess champion could be beaten by a program of today's type able to examine 40 million positions in look ahead when choosing each move. This corresponds to a hundred-fold increase of raw computing power beyond today's level.

Advances of computing technology have so far developed a hundred-fold increase in each decade, and are expected to do so in the coming decade. So the world championship might be expected to fall to a machine in the late 1980s.

Estimates based on such extrapolations are of limited value. It may, however, be possible to give the calculated conclusion some standing as an upper bound. Two independent factors



Relationship between the level of play by chess programs and the size of the tree (after Newborn).

suggest that extrapolation of the Newborn diagram will underestimate rates of improvement:

A: Advance of hardware only is assumed; programming and database techniques are taken as constant over the period - an unreal assumption.

B: Chess programs are just beginning to probe beyond the depth of tactical analysis of chess-masters. There is a possibility, and some supporting

indications, that the disorienting effect upon the human player of the increasingly obscure and tricky styles of play which will result, may be disproportionate. A startling commentary on this second effect was provided in Toronto last year by the attempts of International Masters, Hans Berliner and Lawrence Day, to conduct the attacking side of the King-Queen-King-Rook ending

against a move-perfect machine defence. Theoretically, they should have been able to crush the opposition, but they could not.

They spoke of the upsetting effect upon them of their opponents' bizarre daredevil style, apparently exposing itself to sudden death, for example, by allowing its King and Rook to become separated, and then miraculously surviving.

As for effect A (improvements of programming technique and of machine representations of chess knowledge) current indications also favour acceleration of advance on the machine side.

A pioneering contribution by Jean Pitrat of Paris repays study. His program finds deep tactical combinations of the sort which a Master might miss. Its approach is in stark contrast to the "state-of-the-art" designs on which Monty Newborn's chart is based.

Instead of blindly exploring the forward path, the program reasons its way through the maze, systematically identifying goals (for the program's side) and obstructions (for the other side), the removal of each of which then constitutes an intermediate goal en route to its main goal.

Below is a position taken from Du Mont, together with the published solution and analysis. Pitrat's program does even bet-

ter. Can the reader see how? Solutions will be summarised in the next Chesslab, together with the sender's name and address, or place of work.

White to play

Postscript. A snag in the "upper bound" argument is the possibility of significant improvement during the 10-year period in the standards of human championship play. In particular, deeper insight into the game by masters might accrue as a side-effect of machine analyses. If this were to happen, there could hardly be a more pleasing eventually, nor one of better augury for extending human intellectual reach in the non-recreational domains of science, medicine and technology.

REFERENCES

A chess combination program which uses

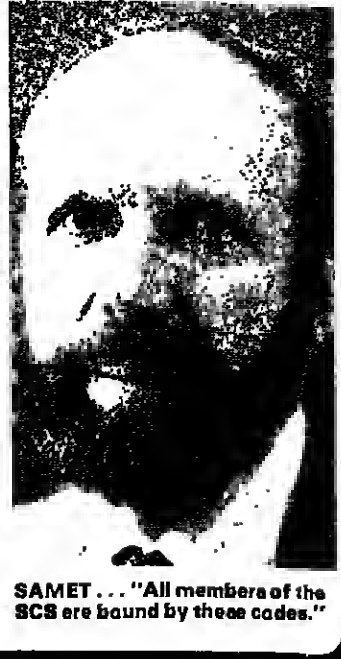
pages 275-321, 1977.

Computer chess, H. J. Berliner, Nature, vol 274, pages 745-746, August 24, 1978.

There is a perennial debate in and on the fringes of the computing community about whether there is such a thing as a "computing profession" — and if there is, how it can be defined. Recently, Roger Griffiths of the BCS professional panel made a recommen-

dation for a new grading structure for BCS membership which would give recognition to practical as well as academic qualifications. Continuing the discussion on professionalism, the following article by BCS president Professor PAUL SAMET discusses the

ways in which the BCS codes of conduct and practice aim at helping to define the qualities that go to make a computing professional. The article is based on a speech given by Professor Samet to the Austrian Computer Society.



SAMET... "All members of the BCS are bound by these codes."

How a computing 'profession' can be defined

GEORGE Bernard Shaw tells us, in "The Doctor's Dilemma," that all professions are conspiracies against the laity. As so often with Shaw, the witty phrase has a certain amount of truth but is not always quite right.

There is a well-established tradition for activities involving the public to be carried out under controlled conditions, by persons whose competence can be demonstrated and who can take responsibility for their actions, by risking their reputation and livelihood if necessary. The greater the risk to the public the stricter the control. This is right and proper.

In law and medicine, for example, there are strict systems of licensing and registration. The practitioners will normally organise themselves, to set standards and to train others to work to these, to help the public and, I have to agree with Shaw, on occasions to help themselves, by restrictions of various kinds. Different professions have different beliefs and procedures, which sometimes conflict.

The question I wish to consider is the extent to which such considerations are relevant to those of us engaged in computing. To do so, I have to consider professions in general and their organisation.

Professions, in the sense I intend to use the word, are associated with performing tasks that are specialised, complicated or dangerous and which involve the public, often with some degree of risk. This obviously covers medicine, law,

engineering, teaching and although one often talks of, say, "the theatrical profession" it is not clear to me how such activities fall into my definition. So I shall ignore them.

Certainly, all activities that I include involve an extended

It is not possible to insist on a general restriction that all computing work be done by professionals, just as it is not possible to insist that all typing is done by secretaries.

period of training leading to a qualification, dedication and some measure of control (by or on behalf of the public).

The training I have mentioned is often carried out at an institution such as a university or polytechnic, which is also involved in the qualification process. In the United Kingdom things are not quite so simple, because until comparatively recently (say 1970) universities did not deal with subjects like technology. There were also religious and political restrictions, and, surprisingly as it seems, until 1828, no institution of higher learning in London.

The great hospitals, on the other hand, and the law courts were concentrated in London, and had been for some hundreds of years. This led to the establishment of special institutions for medicine, giving qualifications, and the organisation of the courts led to a teaching, qualification and control system for lawyers.

The engineering institutions are creations of the last century, originally set up to give qualifications and to set up safety standards, for instance in electrical engineering. In Britain we thus have a wide range of methods for people to get professional qualifications of equivalent standard, without necessarily having to go to a university or similar institution. It is important to realise this because it affects the way societies like the British Computer Society are organised and the role we see for ourselves.

It is, of course, quite natural for people with similar interests to come together, to exchange experience, and so on. I believe, however, that what distinguishes a professional society from a self-help club are social responsibility, competence and ethics. These show respectively our care for others, the standards we set ourselves to achieve and the behaviour we expect of each other, especially in dealing with others. More than that, we announce that those who disregard these standards shall not be counted among our members.

Computing is a new activity and appears to present a problem in a discussion on professionalism. Very large numbers of students are now taught how to use computers, from school onwards, and there is at present no general demand from employers for the possession of computing qualifications for a job in the industry, although such qualifications do exist from universities, polytechnics and the BCS, for instance.

It is not possible to insist on a general restriction that all computing work be done by professionals, just as it is not possible to insist that all typing is done by secretaries. There is only one widely distributed skill that I can think of where everyone who practices it legally needs a licence, driving a car, and this is because of the potential dangers.

On the other hand, there are areas where computers are deeply involved and the public has a perfectly proper right to demand the best possible protection. It is easy to give examples: an aircraft with on-board computerised guidance, and landing systems, a nuclear power station under control of a computer system, an intensive care unit in a hospital, a system with personal information. The first three of these can cause dangers to life, the last can cause threats to individual privacy.

In all such systems it is important for the computer

component to have the same care and attention as the other parts. If society insists that the other parts are only executed by or under the direction of appropriately qualified personnel, perhaps with licences, the same must apply to the computer parts. This is why we can and must consider standards in computing and why we, in the BCS, feel it is right to talk of computing as a profession, just like the traditional ones.

It was in 1968, after considerable discussion and argument, that the BCS adopted a professional structure, with different membership grades to reflect differing degrees of competence and experience. The discussion and argument have continued to this day. Together with the grading structure come a system of examinations and disciplinary procedures. The grades themselves are to reflect knowledge, experience and responsibility. At present they are:

Fellow: Member, fully professional; Licentiate, technically competent, still lacks experience; Associate, not yet fully competent; Student, undergoing training; Affiliate, not computing professional.

The distribution of the main grades is roughly: Fellow 8%; Member 50%; Student 16%; Affiliate 16%.

This is possibly, indeed, prob-

There are fears already that small numbers of people operating computer systems can have major effects on large sections of the population. A recent British Civil Service study suggests that the government is more vulnerable to action by handfuls of computer staff than to whatever the most powerful trade union can do.

ably, too complicated and we are constantly looking for improvements. The (two part) but of course we also give exemption for people with appropriate qualifications. There are almost 200 exemptions that give automatic exemption but many others are accepted after individual consideration.

As an attempt at tackling the question of defining what makes a professional, the BCS has developed a code of conduct and a code of practice. The first has been published already, a draft of the second has been published and the final stages of adding are now in progress.

All members of the Society, and especially all professional members, are bound by these codes.

Any code may be considered as a formalisation of experience into a set of rules. A code is adopted by a community because its members accept that adherence to these rules, including the restrictions this implies, is of benefit to all, inside and outside the community alike. A code also has an educational role, by setting out what is required of those wishing to join the community. It may be said that everything contained in an acceptable code is obvious and merely common sense. This, however, does not lessen its worth. The conscious selection and emphasis of a group of "common sense" items on the basis of experience is by itself a worthwhile exercise.

The code of conduct has five points:

- Integrity. Do not claim competence you do not possess.
- Discretion. Respect confidential information.
- Impartiality. Do not claim to be independent when you have a specific interest.
- Responsibility. Do what you say you will do.
- Representation. Do not get personal advantage at the expense of BCS, when you are acting on behalf of the Society.

Of course, all are obvious but there is a need for staff education about matters of confidentiality and technical ability, an achievement is not easy. As adults most of us are not sinners but as children we have to be taught about right and wrong.

The code of practice has to do more closely tied to the way things are done and can be done. To be of value for more than a very short time in an onerous change is the order of the day it is necessary to abstract essentials. The code covers seven areas:

- Personal requirements. Be competent yourself, be sure your staff are trained to be competent, be ready to improve.
- Organisation and management. Have objectives, match tasks and experience, take care of communication between levels and between equals.
- Contracts. Get expert advice and have a full specification.
- Security, integrity and privacy. Ascertain and evaluate risks, recommend appropriate measures and monitor these in practice; train staff to protect life, data, equipment (in that order).
- Development (Design). Stay within your competence; have standards, of procedure and documentation; involve client; have adequate correction and backup; and above all, ensure technical soundness.
- Implementation. User staff training; appropriate changeover to user staff; proper use of resources.

- Live system. Efficient and reliable; monitor performance and quality; plan for maintenance and enhancement.

At present there is no legislation covering computer work. However, with the spread of legislation concerning privacy, which does affect computer sys-

To ask that all computing activity be regulated is cumbersome, expensive, unnecessary and unenforceable. In the view of the BCS the kind of protection the public desires and to which it is entitled is best provided by licensing and registration of organisations and suitably qualified individuals to perform certain specified tasks.

tems, there will be a demand for controls. There are fears already that small numbers of people operating computer systems can have major effects on large sections of the population. For instance there is a recent British Civil Service study suggesting that the government is more vulnerable to action by handfuls of computer staff than to whatever the most powerful trade union can do.

As a creation of the last 25 years, computing is much more internationally minded than many other activities. It is common for people to work in other countries; they find it easy to communicate with people doing similar work in "foreign" surroundings.

To ask that all computing activity be regulated is cumbersome, expensive, unnecessary and unenforceable. In the view of the British Computer Society, the kind of protection the public desires and to which it is entitled is best provided by licensing and registration of organisations and suitably qualified individuals, to perform specified tasks. To be effective, such licences must be enforceable as well as grantable and the conduct of practitioners must be governed by a code of conduct and disciplinary procedures.

It is our belief that the work we have done will be of help when legislation is not enforced. The legislation will not enforce membership of the Society, nor should it do so. On the other hand, members of the Society will be ready to take their full place as members of one of the important professions of the present time.

MICRO NEWS

Motorola to offer Pascal on MACS

GIVING further credence to the view that Pascal could become the dominant high level language of microcomputing, Motorola Semiconductor has revealed that this software will be the prime language supported on its new microprocessor, MACS, due to be unveiled early next year.

As yet, there are no plans for any other high level language, such as Fortran, Cobol or Basic, to be supported on the device. The only other software available will be an Assembler. Modules are currently in development to fit the company's EXORCISOR development system, to allow it to be used for software development with the device.

As an intermediate upgrade to MACS, Motorola will also be offering Pascal on its existing 6809 processor chip. The language is already available for the 6800 family from an independent source.

MACS, the Motorola Advanced Computer System, is expected to see the light of day early next year, and to show its lineage with the 6800 family, will probably be officially known as the 68000.

With an estimated 75,000 component elements on the chip, it will be the most complex part yet produced by Motorola or anyone else. Housed in a 84-pin package, to avoid the complication of multiplexing the data and address lines, it will offer a direct memory address-

ing capability of 16Mbytes, using a 24-bit address bus.

It is being designed for operation with existing memory devices, with access times typically around the 300 nanosecond mark and 220 nanosecond, according to the company, will be more than adequate.

The instruction set totals 81 mnemonic instruction types. These, however, can be combined with a wide range of addressing modes in the device to provide a theoretical instruction set that easily exceeds 1,000 instructions.

In many cases, however, selection of the addressing mode will be carried out automatically by the device. An example of this is in adding dissimilar operands, through an automatic sign extension function. Operands of 8-bit, 16-bit and 32-bit can be worked with, through a wide range of bit manipulation functions.

Though still working at the "paper simulation" stage, Motorola is claiming that the 68000 will be a fast processor. Two million instructions per second is the target operating speed, while the data transfer rate is being set at 500 Kbytes per second.

Multiprocessing is already being seen by the company as an important potential market for the device, and this has been one of the important criteria in the

design of the chip's bus structure. It will be a fully synchronous bus which, according to Motorola, will be able to cope with peripheral and memory devices that are speed limited.

For example, in operations such as memory accessing, the bus cycle will finish when the memory function has been completed, not when a defined time cycle is completed. This adds the possibility that functions performed by devices that are physically separated by some distance can be accommodated.

Like its predecessor the 6800, the 68000 will operate with position independent code.

Several developments are already in the pot for the device, including a memory management chip which should be available shortly after the processor, and a hardware floating point version of the device. This is planned to be a derivative of the 68000 incorporating floating point maths on the processor chip.

Until it is available, a firmware floating point maths routine will be available, but according to the company, its use will not involve any software conversion work on upgrading to the new version.

Simulated benchmarks of the 68000 have indicated that the device will be offering an order of magnitude improvement over competitive processors.

Colleges launch autumn courses on computing

AS the new academic session gets under way, several colleges are launching autumn courses on various aspects of microcomputing and the microprocessor.

At the Polytechnic of Central London, a research course on multi-microprocessor systems is to be held between October 2 and 6. Jointly sponsored by Poly and the Institut de Recherche d'Informatique et d'Automatique, the main government institution in computing and automation in France, the course will cover, as a major topic, the problems of reformulating the methodologies of current computer networks to cope with the connection and co-ordination of systems incorporating 100 or more microprocessors.

Further information can be obtained from Julia Kassel at the Poly, 309 Ragant Street, London W1.

Also scheduled are a series of day release and evening courses, by Merton Technical College, Morden Park, London Road, Morden, Surrey, covering a wide range of aspects in microcomputing.

The first is System Design Using Microprocessors, a 10 week course of one day a week that is aimed particularly at engineers requiring an update in the microprocessor field. It will cover most of the important aspects in system design, including digital systems theory, architecture, interfacing principles, software design, and software/hardware trade-off considerations.

Approximately half the course will be devoted to practical work. It will start on September 25.

For those wanting to learn about the subject from a low level, the college is also running three evening courses. These are: an Introduction to Microprocessors, an Introduction to Microprocessor Software, and a Microprocessor Workshop. The first two are of six weeks duration of one evening per week, and together provide a basic grounding in the subject.

The 12 week workshop will allow students to develop systems and software, using the college's facilities. Further details can be obtained from the course organiser, Bill Wittma.

Newbear to unveil 'personal' Panda

A NEW personal computer system, known as Panda, has been introduced by Newbear Computing Store. It is to have its first public showing at the Personal Computing World Show later this month at the West Centre Hotel in London.

Based on a Motorola 6800 chip, the system features 8 Kbytes of read/write memory, and 8 Kbytes of EPROM. The normally will hold an advanced Basic interpreter.

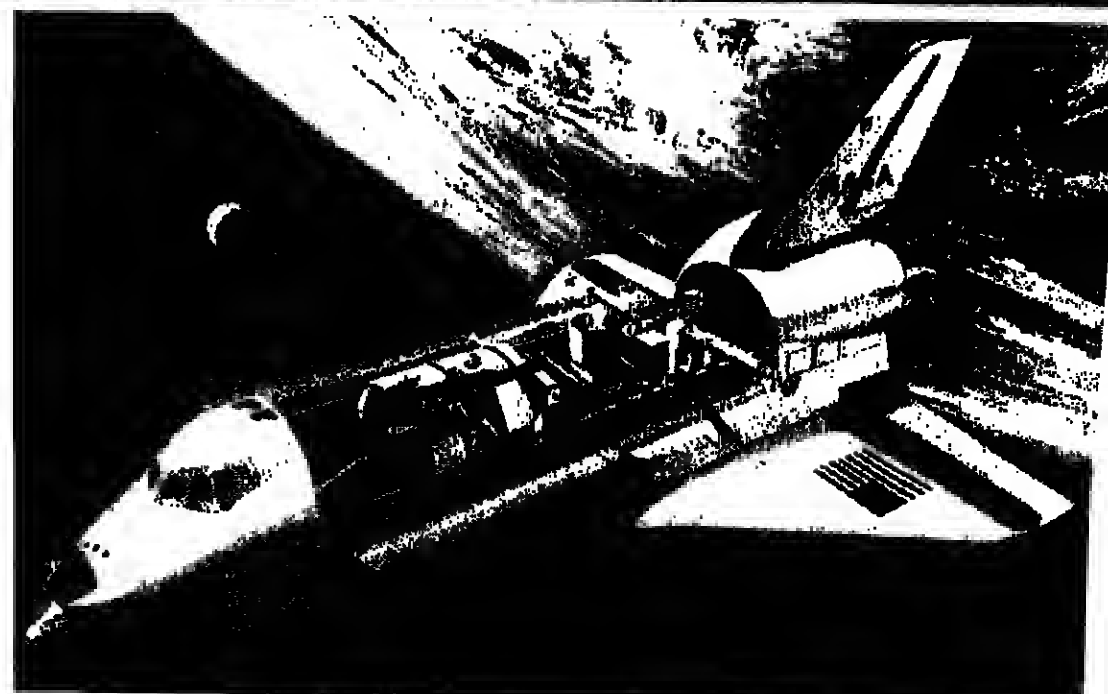
Inch display capable of showing 16 lines of 64 characters each.

A prototype of Panda was first seen at Newbear's stand at Microsystems '78, and although the production version is slightly larger, at 12 inches wide x 20 inches deep x 11 inches high, it is still one of the smallest systems currently available.

Interfaced for audio cassette, and aerial RS-232C/V24 are available for the system's 80-way bus structure, together with TTL compatible parallel input/output board based on Motorola's peripheral interface

adapter. The baud rate of the serial interface is programmable between 110 and 1,200 baud, and the system can also be used as a remote terminal to another computer system.

In addition to the normal facilities of an 8K Basic, Panda's firmware interpreter offers refinements such as multiple statements per line, cassette file handling, user definable string length, and a Trace debugging facility. Error messages in the language include coverage of incorrect file numbering.



AN artist's impression of the Shuttle spacecraft, which will be the home of the joint US-European Spacelab project. Among the early experiments planned is research into the production of electronic materials, such as circuits.

Solid state research in space

FOLLOWING the news that the Russians have been carrying out research into producing semiconductor materials in space (CW1, August 3), the American National Aeronautics and Space Administration has revealed plans to perform similar work as part of the Spacelab project.

Due to be launched in 1980, the Spacelab will carry with it a range of material processing experiments, some of which will relate to the production of electronic materials.

Negotiations are currently taking place between NASA and TRW Defence and Space Systems Group, which will be acting as prime contractor in the development of the experimental equipment required for the missions.

Details of the actual experiments have yet to be finalised, but if the efforts of the Russians are any guide, the growing of more complex semiconductor materials, such as indium antimonide, will be high on the list.

The most recent experiments completed by the Russian Cosmonauts in Salyut 6 have included producing semiconductor compounds based on cadmium selenide, gallium arsenide, and indium antimonide.

The long term importance of this work which for the time being, at least, gives the Russians a theoretical lead in advanced semiconductor research, is that crystals produced in zero gravity offer several distinct advantages over those grown on earth.

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IBM reorganises as prelude to two new series

RECENT organisational changes at IBM are a prelude to the announcement of new E and H series models (CW, August 31) and also, some observers believe, possible preparation for the break-up of the IBM into autonomous divisions or even independent companies.

In any event, the changes are more than merely for administrative convenience, and are strong indicators of IBM's likely future directions.

One of the most detailed analyses of the nature and meaning of the changes has been prepared by the Technical Analysis Group of New York consultants Advanced Computer Techniques. The study is entitled *IBM Systems in the 80s*.

A key aspect of the new IBM organisation structure, according to the ACT study, is the dividing of the Systems Product Division into two separate divisions, one still called Systems Product Division responsible for all current and future intermediate-scale processors including the E series and related software/microcode; and the other called Data Systems Division, which has a similar function for large processors, including the expected H series.

Bob Fertig, head of the ACT Technical Analysis Group, has developed with his colleagues what is believed to be an accurate organisational chart for the new SPD and DSD structures, which both report to Paul J. Rizzo, an IBM senior vice-president and head of the Data Processing Product Group (see chart below).

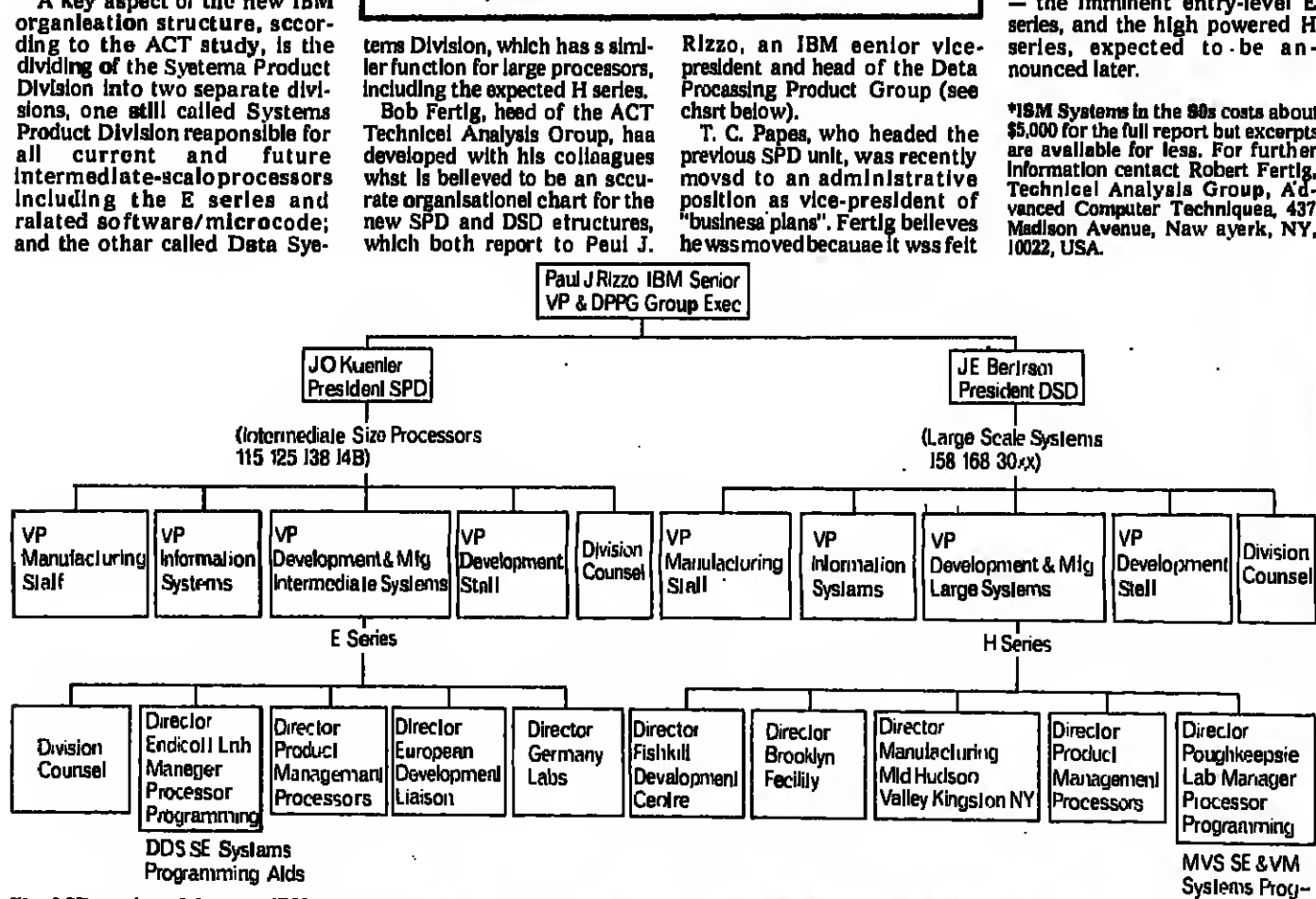
T. C. Papes, who headed the previous SPD unit, was recently moved to an administrative position as vice-president of "business plans". Fertig believes he was moved because it was felt that Papes was "responsible" for the unexpectedly high demand for the IBM 3030 line (CW, August 31).

It is also Fertig's view that software and hardware development groups have been joined under the new organisational plan so that shifts in systems functions may be more easily accomplished.

Both SPD and DSD include their own processor, programming and systems software (including microcode) capability. Indicating, Fertig suggests, greater interlocking of hardware, firmware and software functions in future products.

ACT claims there is a distinct difference between groups working on the low-end mainframes — the imminent entry-level E series, and the high powered H series, expected to be announced later.

"IBM Systems in the 80s" costs about \$5,000 for the full report but excerpts are available for less. For further information contact Robert Fertig, Technical Analysis Group, Advanced Computer Techniques, 437 Madison Avenue, New York, NY 10022, USA.



The ACT version of the new IBM organisational chart for its Systems Product Division and Data Systems Division.

DG multiplexer advances

A FOUR line asynchronous and a single line synchronous controller have been combined on a single multiplexer board by Data General.

The ULM-5 universal line multiplexer is a 15 inch square printed circuit board that occupies a single slot in a Data General Nova or Eclipse chassis. It is software compatible with Data General's ALM and SLM series multiplexers and is supported by their operating systems.

On its own the four lines asynchronous controller comes as the model 4241 at \$2896, the same price as model 4242, the single line synchronous controller, on its own. Together as the ULM-5 model 4243 it costs £1,728.

Moss system spearheads £35m railway line diversion

A COMPUTER-BASED highway design called Moss (Modeling System) is to be used by Durham County Council to assist British Rail in its plans to divert part of the London to Newcastle railway line to avoid National Coal Board works at the Selby coalfield.

If the £35 million scheme were not carried out British Rail says that its 125mph trains would have to reduce speed between

Council lettings automated

A COMPUTER-BASED system for handling the letting of council houses is to be set up by Leicester City Council.

Based on the council's IBM 370/138 the system, expected to cost about £100,000, will help in the processing of applicant information and the suitability of available accommodation. It will also be linked to the present rent accounting system.

"When it is introduced, the new system will make a vast amount of difference," said a council spokesman. "The old manual system involved a lot of paperwork and filing, but the whole letting procedure will be faster and more efficient."

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The first screen word processor from BDP of Isleworth, which has hitherto dealt solely in hard-copy machines, will be one of the items on show at the London Business Equipment Exhibition from October 24 to 27. Organised by BETA, the show will be held at the Connaught Hotel.



Weather satellite images on display

LIVE satellite images of the weather over the North Atlantic and Europe are being displayed at the Farnborough International Exhibition this week by the system developed in the UK by the Data Systems Group of Gresham Ltd.

The digital images are from the European Space Agency's Meteosat satellite and are being received by a three metre dish aerial on the roof of the Department of Industry stand at Farnborough.

The Gresham system includes a Digital Equipment PDP-11/04 which is programmed to store on a fixed head disc drive all the 8-bit elements, or pixels, that make up each image. The computer can then display the complete image on the system's TV monitor or zoom on to a particular section of the image by selecting and displaying all the pixels that make up that section.

Another important facility provided by the software on the PDP-11/04 is adding false colour to the monochrome images received from the satellite. The colour assigned to any segment depends on the intensity of the shade of grey.

The system can also store up to eight colour or 32 monochrome images and display them as an animated sequence.

The system at Farnborough is a modification of a Gresham image processing product already used in body scanners and for military applications.

Water board link-up

A COMPUTER system to monitor and control water supply, sewage treatment and river management is to be installed by the Wussex Water Authority. Suppliers of the equipment will be Serck Controls of Leamington Spa and, who fully operational, the system will provide an interlinked control and data collection system covering 70 outfalls in three districts.

Vindicated

STANDBY arrangements for an online database system in Edinburgh were successfully transferred to a day to an IBM 370/138. The implementation — through the implementation of the first such operation in Europe — was carried out under an agreement made last year between the Scottish Widows' Fund and Life Assurance Society, which 370/145 was down for repair due to software problems.

Retrieval

A MEETING on the use of intelligent terminals in information retrieval is to be held at the University of Southampton. It has been organised by the BCS Specialist Group in Information Retrieval. Speakers will include David Bagley from Hatfield Polytechnic and Williams from UMIST. The library, R&D Department

In Northampton in a year's time, and the second will follow one year later. Once the first 2980 is installed, the DME operating system will be used to support the 50-dot Blackwood Hodge communications system during the prime shift, and during the other two shifts, programs will be converted to run under VME/K.

How micros will change the face of computer design

"I CAN'T find any commodity on this planet that simultaneously give better performance, less cost of ownership, consume less power, or that are more reliable." Speaking at Hewlett-Packard's semiconductor sapphire programme, could be talking about the latest offering to roll off General Motors' production line, but is in fact describing how he sees the ubiquitous microprocessor.

Up to 20,000 integrated circuits a month of various kinds are produced at the facility and it is the axle around which much of the company revolves, as Lopp explains.

"We are essentially a supplier of CMOS and SOS components to other Hewlett-Packard divisions," he said. "And what we are doing with this technology is replacing the way we design and build computers. In the past we have thought about integrated circuits as an element in the hardware, but we are at the stage now where the integrated circuit is the hardware."

"By 1985/90, somewhere in that time-frame, that's how you are going to make computers. There may be printed circuit boards and there will still be sheet metal around the box, but the electronic functions will be done by integrated circuits — totally."

On the semantic issue of what to call such computers, Lopp has this to say:

"With LSI and VLSI technology, we are very close to the point where it is actually possible to create a real computer on a single chip. Whether we call them mainframes, minicomputers or micros doesn't matter — that's a marketplace issue."

"Microprocessors have been defined as the sort of thing you find three to four of inside model aeroplanes, TV games, automobiles, or medical instruments."

"The definition we use here at Hewlett-Packard is very different because it is not very dependent on the hardware base. It is dependent instead on the application of the product rather than how to create it. So in our context, a computer is the thing that does the set of tasks we have decided to provide for our customers, whether it is a micro or a minicomputer."

Giving an explanation of why integrated circuit technology is superb at assuming new guises, Lopp said, "A statement I would make with a very high degree of assurance is that as fast as we are going to be made with LSI and VLSI chips. There is general agreement on this here in Silicon Valley. It is an applications area; computers is more than we need at the moment and it can be forced to evolve faster than we can figure out how to use it. How many gates would you like in a chip? ... How fast would you like the gates to be?"

Nine different circuits are currently produced by HP, six of which are the company's Micro Computer Chip (known as MC) family designed specially for control applications. About 20 other designs are in progress and although none of them is currently intended for sale outside HP, it has not ruled out the possibility of offering SOS circuits to other companies.

Lopp describes the state of play regarding packing density per chip. "In production we are at 25,000 devices easily on a chip," he said, "and in development, which tends to be two to

three years out, we are at four to six times that. We are also working on concepts that will utilise several million devices in a circuit. The available complexity is very impressive, however."

"For example, take one of our minicomputers and separate it into the intelligent portion, the memory portion, and the stuff that is stored in the I/O portion — we can put any one of these three functions on a chip and in many cases end up with more capability than is required."

This ability leads to some interesting conclusions.

"So what we can talk about," said Lopp, "is adding value in the future life of the product. I don't know how we are going to do it, but

half a million rectangles and that's not a very pleasing job. In fact, it's the kind of job you look at and immediately convince yourself that the computer is a whole lot more capable of doing it than we are. They don't tire or get bored. It's the class of job you can delegate to the computer and then use the human for what he is good at — the more creative and innovative tasks."

"What we are trying to create for the designer is an environment where it is a creative and intellectual challenge to design an integrated circuit, not drudgery."

But there are dangers in off-loading work on to the computers, as Lopp is well aware.

As films are linked with Hollywood, so semiconductor are immediately identified with Silicon Valley, where one of the cast of stars is Hewlett-Packard.

Sited on Stanford Industrial Park land, HP's semiconductor facility uses its 30,000 sq ft of clean room to develop and manufacture SOS silicon on sapphire, and CMOS, complementary metal oxide silicon, circuits for products

ranging from electronic test equipment to mainframe computers.

Finding out the problems of producing these micro jigsaw puzzles, ROBIN WEBSTER went to Silicon Valley to see Lerry Lopp, engineering manager of Hewlett-Packard's SOS programme.

Lopp believes that with microprocessor technology, the changing face of computer design will change even faster.

"We are now taking the steps that put the computer in us as an active participant in the manufacturing process," he said. "I don't see it as a large technical challenge to be able to do this, but it's a pretty important social issue on whether our labour force is going to feel good about this computer telling them what to do. I think you have to move slowly in these environments."

To make full use of integrated circuit hardware, it is essential to match it with good software, which has its own price to pay.

"The real value of the micro is the technical ability it allows, but it takes an understanding of that to customise it to particular applications — and that understanding typically comes from software engineers, people who know how to use it. So the micro costs you a buck-and-a-half, but it costs you \$3 million to get into the business of applying these things."

"You can do an analogy with the educational system," said Lopp. "If you have a lot of children who don't receive education, it is unlikely that you are going to have a lot of happy, useful citizens. The hardware is there, but it is stupid. Somebody has to train it and that essentially is what software does; it trains and focuses the power of the hardware."

What sort of training is HP giving its own hardware?

"In the past, most of our activities have been to understand and control the relationships of different boxes and the internals with one another and provide a reasonable language."

"If you look at how integrated circuits are created at the moment, it is a drafting job of immense dimensions and incredible boredom. To make a 100,000 gate array means the precise placement of perhaps

but simplistically, you can say let's sell a guy three computers on a chip and he gets to use whichever one of them works. Or we can teach the three how to argue among themselves and give him the answer that two agree on."

"This is not quite feasible; it is coming. There is no reason why excess circuit capability can't be used to improve the life of the product."

In an attempt to improve the design of its products, HP has relegated much of the recording and processing of design information to computers — about 30 of them in the 50,000 sq ft of the Cupertino lab.

"If you look inside the lab here you see that we are using computers to manufacture themselves," said Lopp. "It's the only conclusion you can come to. More and more each day we are training these things to build themselves."

"Computers keep track of the production process and document it for us. There is so much data. The time-lag between theoretical devices and the practical production of them I think is partially because of the time it takes to achieve the required manufacturing control. The lag seems to be getting longer in some cases, and one of the major applications of our computers is to try and correct this."

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age capability for the customer to instruct the machine. That's where we have been historically.

"However, I quickly found that all the internal stuff had been relegated to LSI chips, and so if you wanted to connect this box with that one you just put an LSI chip in there. That's the end of that; you don't have to do any programming because it is already taken care of for you."

"Our activity has moved up a level now, and we are making the language more appropriate — a 'friendlier interface' is a term we use a lot. We are also starting to do much heavier applications work specialising collections of hardware to particular jobs."

"It's tough to do that. For example, take a business computer and present it to a company and say this is your accounting system, your working process, your inventory management system. They may not agree with the set of choices we have made. So in the applications area you are getting into the inside workings of a company, and it's risky. They may choose to do the job differently from your way of thinking."

Lopp did feel, however, that Hewlett-Packard was in a good position to reap the benefits of all the expensive development work that has gone before.

"I think we are at a point now which is rather unique in HP's evolution," he said. "We have spent ten years trying to figure out what technology we need, how to manage it, how to apply it, how to make a buck. It's the game we play, and we might as well play it with a consistent set of rules. We have spent a lot of money doing that, a lot of time. I think we have a solid evolving sense of how to integrate these things into a business. So we are sort of coming out of the acquisition and research and development phase in HP and moving into the exploitation — the business exploitation of the capabilities."

Part of this exploitation undoubtedly rests on educating people in the computer's abilities, showing what it can do for them. But Lopp felt that there was still a barrier here that had to be overcome.

"There is, I think, a fairly unique thing in computers, because they are so magic, they have a 'gee-whizz' aura. They put people off; you see it all the time. The typical layman is afraid of the technology, and that's a bad situation to be in."

"I don't care if nobody knows how the computer works; the question is: is it performing the function we've relegated to it in an efficient, caring way? You've got to get people up to the point where they can understand the application of the technology, not necessarily how the thing works."

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In the past three years, computer services companies have sprung up all over India. Most have already forged links with US mainframe or minicomputer manufacturers, but three of the

larger and better established companies, Shaw Wallace and A. V. Thomas in Madras, and Datamatics in Bombay, as yet have no foreign associations. Tim Palmer continues his Indian report.

Services companies look for links with the Western world

AMONG the Indian computer services companies hoping to do business with their counterparts in Europe are several which as yet have no formal links with any US or European organisation, East or West.

Shaw Wallace Computer Services in Madras is one of the largest. An offshoot of the Anglo-Indian Shaw Wallace and Company, itself a member of the Sime Darby group, it runs a ser-

vice bureau on an ICL 1901A computer in Madras, and offers complete facilities management services to other Indian companies.

Shaw Wallace plans to replace the existing computer with ICL's new 2950, and also has access to IBM 370 and 360, Burroughs 1700 and DECsystem-10 mainframes, and programmers experienced in Cobol, Fortran, PL/I, Plon and Autocod.

The company is keen to take on programming, conversion and data preparation work for foreign clients, and is particularly interested in joint ventures in the Persian Gulf, where it plans to open a service bureau.

On the data preparation front the company guarantees a turnaround time of 12 days including transit time, pointing out that the International airport at Madras has good intercontinental links.

It claims that its charge for punching, verification, validation and encoding on to magnetic tape of data are 50 to 70 per cent of those in the US and Europe, including the cost of air freight.

Its most important overseas contract to date requires it to develop and install a data collection system involving some 25 Datapoint processors for Sime Darby plantations in

A mainframe computer is a valuable piece of hardware in any country, but no more so than in India. The picture shows a shoplifter making friends with the Indian-built ICL 1901A computer at Shaw Wallace in Madras. Muggings remove their shoes before entering a mosque, but this practice at Shaw Wallace does not mean that the computer room has been consecrated a holy of holies. It is simply a further measure to ensure that the atmosphere remains clean and dust-free.

Malaysia. Data will be collected offline, but ultimately it is intended that all the processors in the field will be linked to a mainframe planned for installation at head office. Projections indicate a major improvement in profitability as a result of freeing managers from time-consuming paperwork.

Across the country in Bombay, one of the most ebullient and confident figures on the Indian data processing scene is Lalit Kanodia, founder and head of Datamatics. Kanodia worked as a consultant to both Ford and Arthur D. Little, worked on Project MAC at the Massachusetts Institute of Technology, and founded Tata Consultancy Services, India's premier computer services company, before leaving to set up Datamatics.

Problems simply do not exist for Lalit Kanodia. "I can give you a decision on behalf of Datamatics in 48 seconds," he says, in between reeling off statistics about his company. "Gross Notional Product is \$70,000 million; we have the third largest technical manpower and the largest number of unemployed graduates in the world. We also have the cheapest manpower."

Datamatics employs 150 people, 40 of them computer professionals. It has three IBM 1401A in-house and, like everybody else, buys time on most of the third generation machines accessible in India.

"Our turnover is \$1 million, but the equivalent work value in Europe would be \$5 million. Our business is 100 per cent computers, and 1978 is the year we intend to go international."

Datamatics is currently in consultation with four US companies about taking on the Indian distributorship for their products.

Kanodia declined to name the companies but they are understood to be Prime, Modcomp, Harris and Wang.

"Our future plans include putting in two or three one Megabyte minis of our own, and we are seeking access to large third and fourth generation machines for software development."

Kanodia is also looking for high-volume data preparation work. "We are thinking in terms of jobs involving five million cards. We would guarantee 99.9 per cent accuracy, and provide a one to two month turnaround. In the US, the charge is 20 cents per 80-column card record punched and verified. In Taiwan, it costs 10 cents. We can do it for 4 cents a card," he says. "Conversion and data preparation are easy and savings are 80 per cent. On-site work is harder, but using Indian personnel would still save 50 per cent of the cost."

The business Datamatics is seeking overseas includes the supply of trained manpower for periods of three months to a year; contract programming; collaboration on joint projects; conversion; and data preparation.

In India we would charge \$50 per man-day for a senior programmer with five to 10 years' experience; in the US we would charge \$100 a day plus travelling expenses.

"Half our people have worked abroad and we have taken 80 per cent of the new service contracts in Bombay, and we have only lost one client in three years. We handle the accounts for Thomas Cook and Diners Club in India, and sorted out the problems of the State Bank of India on its IBM 1401." That, it transpires, was before Datamatics came into being; but Datamatics and Lalit Kanodia appear to be synonymous and interchangeable.

After the enthusiasm of Datamatics, the conservatism of A. V. Thomas, offshoot of an old plantation company in Madras, is sobering. A. V. Thomas runs a data centre on IBM 1401 and 300/30 machines, has 35 technically qualified people, claims 25 per cent of the Madras computer services market, and processes local college examination results on the computer, so claiming a head start in identifying people suitable for recruitment.

The company is keen to arrange a partnership with a computer (preferably mainframe) manufacturer, and is bidding for major government contracts on the basis of used IBM 370s — simply to gain experience in tendering procedures. It would like a long-term partnership extending beyond India, and is interested in providing marketing support in other Third World countries.

A. V. Thomas has made a clear-sighted appraisal of the hurdles to be overcome if it is to succeed, and recognises that ready-made talent for the kind of foreign work it would like to do simply is not available in India, which is why it sees a close collaboration with a major foreign company as essential.

Longer in the computer business than most, Ferguson Management Consultants has offices in Delhi, Madras, Bombay and Calcutta. The company has 68 professional consultants, not all of them directly associated with computer-based applications.

The company claims experience in India on water and sewerage, urban development, power distribution and shipping systems, and has also worked in Tanzania, Kenya, Egypt, Nigeria and Ethiopia, as well as working as a sub-contractor on steel works and banking applications in Indonesia.

Its business splits three ways between computer consultancy and system development, non-computer consultancy and personnel recruitment.

In the last area, it quotes rates of \$10 an hour for programmers, \$15 an hour for analysts, \$18 an hour for a senior analyst and \$28 an hour for a project manager. Prices exclude overseas living costs and are based on a 140-hour month, although Ferguson says that employees would get 180 hours of work a month out of the staff supplied.

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The business Datamatics is seeking overseas includes the supply of trained manpower for periods of three months to a year; contract programming; collaboration on joint projects; conversion; and data preparation.

In India we would charge \$50 per man-day for a senior programmer with five to 10 years' experience; in the US we would charge \$100 a day plus travelling expenses.

"Half our people have worked abroad and we have taken 80 per cent of the new service contracts in Bombay, and we have only lost one client in three years. We handle the accounts for Thomas Cook and Diners Club in India, and sorted out the problems of the State Bank of India on its IBM 1401." That, it transpires, was before Datamatics came into being; but Datamatics and Lalit Kanodia appear to be synonymous and interchangeable.

After the enthusiasm of Datamatics, the conservatism of A. V. Thomas, offshoot of an old plantation company in Madras, is sobering. A. V. Thomas runs a data centre on IBM 1401 and 300/30 machines, has 35 technically qualified people, claims 25 per cent of the Madras computer services market, and processes local college examination results on the computer, so claiming a head start in identifying people suitable for recruitment.

The company is keen to arrange a partnership with a computer (preferably mainframe) manufacturer, and is bidding for major government contracts on the basis of used IBM 370s — simply to gain experience in tendering procedures. It would like a long-term partnership extending beyond India, and is interested in providing marketing support in other Third World countries.

A. V. Thomas has made a clear-sighted appraisal of the hurdles to be overcome if it is to succeed, and recognises that ready-made talent for the kind of foreign work it would like to do simply is not available in India, which is why it sees a close collaboration with a major foreign company as essential.

Longer in the computer business than most, Ferguson Management Consultants has offices in Delhi, Madras, Bombay and Calcutta. The company has 68 professional consultants, not all of them directly associated with computer-based applications.

The company claims experience in India on water and sewerage, urban development, power distribution and shipping systems, and has also worked in Tanzania, Kenya, Egypt, Nigeria and Ethiopia, as well as working as a sub-contractor on steel works and banking applications in Indonesia.

Its business splits three ways between computer consultancy and system development, non-computer consultancy and personnel recruitment.

In the last area, it quotes rates of \$10 an hour for programmers, \$15 an hour for analysts, \$18 an hour for a senior analyst and \$28 an hour for a project manager. Prices exclude overseas living costs and are based on a 140-hour month, although Ferguson says that employees would get 180 hours of work a month out of the staff supplied.

MAGNETIC STORAGE MEDIA

Cutting the costs and increasing the speed

The world of magnetic storage media is characterised by steadily falling costs per bit in most established technologies, such as semiconductor, main memory and rotating memories, and also by the development of interesting new methods of storing data. Some of these new devices, for example charge coupled devices, are now being incorporated in commercial products, while electron beams and lasers show promise in the longer term for reading and writing data.

This special section on storage media includes an article by Vernon Bluhm, manager of amorphous devices at Burroughs, in which he describes an interesting new semiconductor technology called ovonic memory. This is a completely non-volatile device that employs amorphous semiconductor material. John Moore, manager of European operations for Naahua Computer Products, discusses the continuing development of the floppy disc; and in this first article, Colin Madeley, north European sales director of Storage Technology, looks at the hierarchy of storage products that ranges from expansive fast access main memory to high capacity disc and tape storage with very low costs per bit.

By Colin Madeley

CONSIDERED by many to be as important to human development as all the inventions and innovations introduced during the first 150 years of the industrial revolution, the computer has literally revolutionised our society. The impact on our entire civilisation, and on business, government and the political processes in particular, is staggering.

The driving force behind these technological miracles was the need for data storage advances. By significantly cutting the cost of putting data online, these technologies have helped to move the computer directly into the spectrum of our everyday lives. It has been a truly astonishing advance.

Before elaborating on current spectacular technology, a brief review of the impact which data storage advances have had on the data processing industry is indicated.

In fact any review of the history of data storage will of necessity be brief and cover a relatively short life span. The roots of data storage lie in magnetic tape, the high-speed alternative to punched cards. Contrary to what most people expected, and indeed forecast, magnetic tape has weathered three decades in a rapidly

changing industry. As perhaps the ideal sequential access device, tape's capacity has increased from 200 bits per inch to 6,250 bits per inch, and it is the most cost-effective storage medium.

There are, however, some disadvantages to using tape. Because the tape stores information sequentially, the user must collect information in batches before it can be put on tape. Batching and searching with tape is very time-consuming for some applications.

These disadvantages provided the impetus for the next entry in the storage hierarchy, namely, disc. With disc data storage, the user can directly access a particular data record.

Disc data storage, introduced in 1956, offered five Megabytes of storage, 100 bits/inch, and a data rate of 10 kilobytes/second. Disc storage needed to keep pace with the developments in the computer, spurred by the advent of semiconductors which increased storage demands. Storage requirements continued to surge with the introduction of IBM's operating system, making multiprogramming and multiprocessing possible.

As technological advances in computers created the need for more storage, technological ad-

vances in storage made greater capacity available. Increased disc density and capacity per spindle offered customers reduced costs per Megabyte of online data, and in fact a reduction by a factor of two-thirds was made in four years. Since 1970, just prior to STC's entering the disc market, the price of disc storage per Megabyte has again been reduced by two-thirds. Continued improvements in data rate, together with reduction in access motion time and rotational delay, and improved reliability have made computer systems practical for many users.

Not insignificantly, technological advances in the high-speed access products have also reduced costs. Four kilobytes of add-on memory were priced at \$300,000 in 1960. Today, the price for a Megabyte of memory has been reduced by more than a factor of 10. The developments in memory have coincided with on increased need for storage and a complementary reduction in cost.

It is a widely accepted belief that the storage hierarchies will not change substantially in the next decade. To date no single storage technology has been discovered that meets all the performance requirements of

large processors, provides for data sharing, and at the same time presents a reasonable cost for storing data, comparable to tape. The real challenge facing today's manufacturer is to offer storage products that provide for all three.

We also anticipate an increase in the number of storage levels, within the next five years, to fill the gaps that now exist in the price/performance spectrum. Building upon the current storage hierarchy consisting of memory, disc and tape, future hardware will possess at least five levels, Figure 1.

The new level, secondary storage, will fit between main memory and disc in relationship to cost and performance. Typical applications for this storage level include external page storage, systems, catalogues and work area. We expect the need for secondary storage will continue to grow dramatically as the use of virtual storage becomes more common.

The second new storage level we see developing is archival or automated mass storage. This level is one which will fit between disc and tape in the cost/performance spectrum. Early attempts at this level can be seen in the IBM 3650 and the CDC mass storage systems.

However, until now, products for this level have achieved neither wide user acceptance nor a consensus on architecture or format. We believe that over the next five to 10 years improved products will be available and this level will grow in acceptance.

The migration of the supervisory function away from the CPU will be yet another significant architectural trend. Until now, all control functions relative to the physical location of data — its logical organisation, its cataloguing and necessary — have been under the control of the operating system and the user.

Part of this function will be moved out in the storage subsystem. The data will be called for by name, and the subsystem will have to locate and format it for the required application.

Together with the migration of the supervisory function away from the CPU, the virtual device concept will be introduced. Using it, the user will no longer have to concern himself with customising such things as data organisation or access method for new peripheral de-

vices. The subsystem will have the power to handle these functions and by doing so, will boost the processing power of the system.

In the technology area, we maintain that existing technology, namely semiconductors and magnetic recording on both disc and tape, will remain the dominant storage technologies for the next 10 years. Storage will slowly tend to migrate toward solid state devices as the price of memory is reduced relative to other technologies.

However, considerable time and money will be spent on refining densities, speed, cost and reliability in disc and tape. For example, in five years we expect to see developments in the high performance disc area that include access times of less than 20 milliseconds, and costs of approximately one-half of today's prices.

We also expect on emphasis in the low performance/low cost disc area. With increased capacity reaching several billion bytes per spindle, these disc subsystems will have slower

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CMC Reality gets the Royale treatment

PERFORMANCE of REALITY, CMC's mini-computer based business management information system, has just been considerably improved in six major areas: so significantly we've renamed the product REALITY ROYALE.

Calculation speed has been improved by moving several functions from core to micro-processor chips (the firmware). Here, local high-speed memories work much faster so many DATA/BASIC programs, whose speed is determined by CPU, run two or three times as quickly.

Terminal input/output is faster because of improvements to routines moving data to and from terminals, and buffer size has been increased, too.

Use of **disk space** is now more efficient. One innovation is the use of a special firmware technique to locate data in core without a large search.

Expanded **main core** is now available to 128K. Addition of main memory is, among other things, an inexpensive way of expanding the number of 'responsive' terminals.

ROYALE

REALITY ROYALE's new process scheduler allows users to ensure maximum performance where it's needed most - big batch jobs can be prevented from slowing down inter-active work (data access, data entry, etc.) by giving them lower priority.

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In October REALITY ROYALE manufacture begins at CMC's Hemel Hempstead factory which is also being expanded to cope with demand for SOVEREIGN. CMC's recently announced data entry system.

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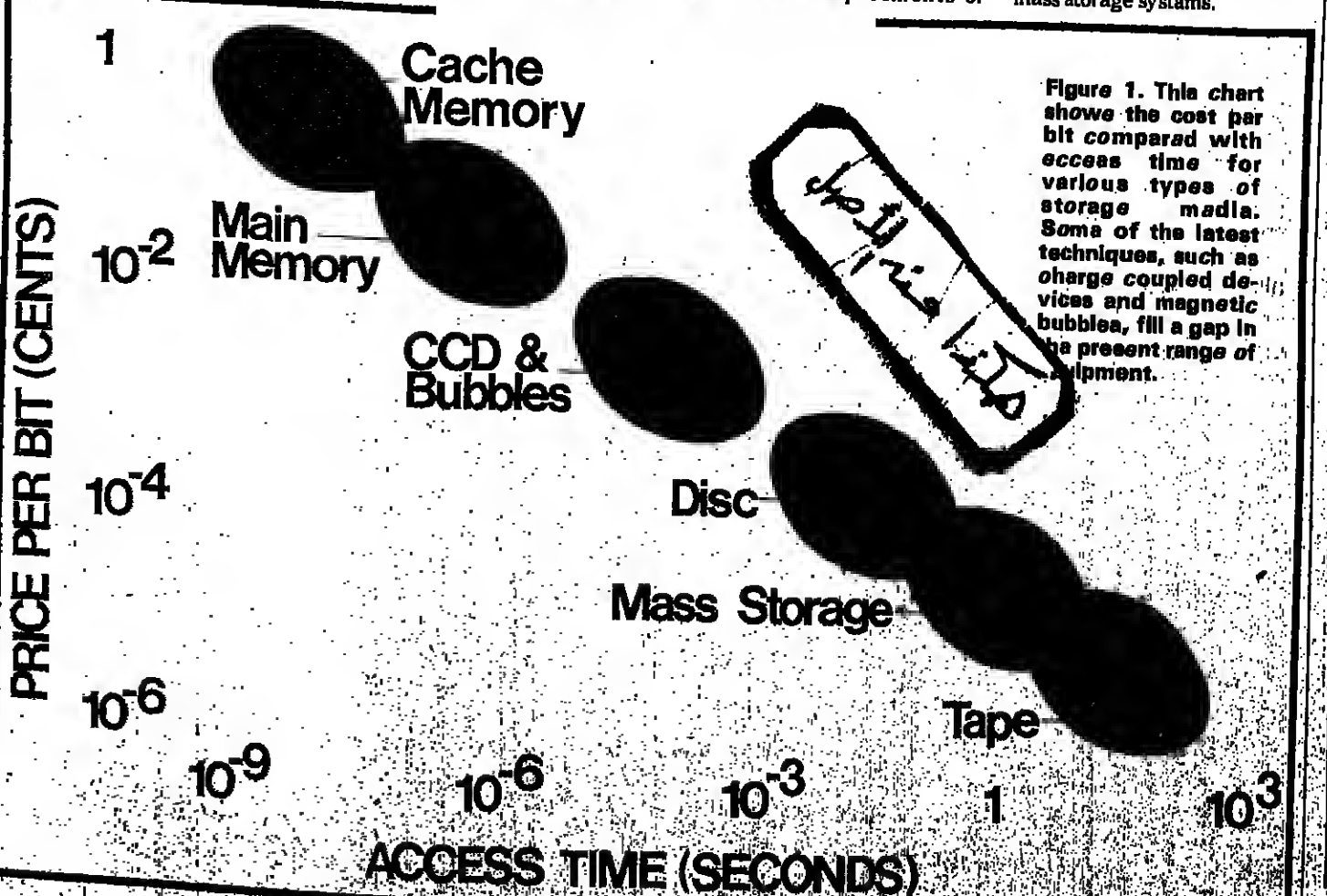


Figure 1. This chart shows the cost per bit compared with access time for various types of storage media. Some of the latest techniques, such as charge coupled devices and magnetic bubbles, fill a gap in the present range of equipment.

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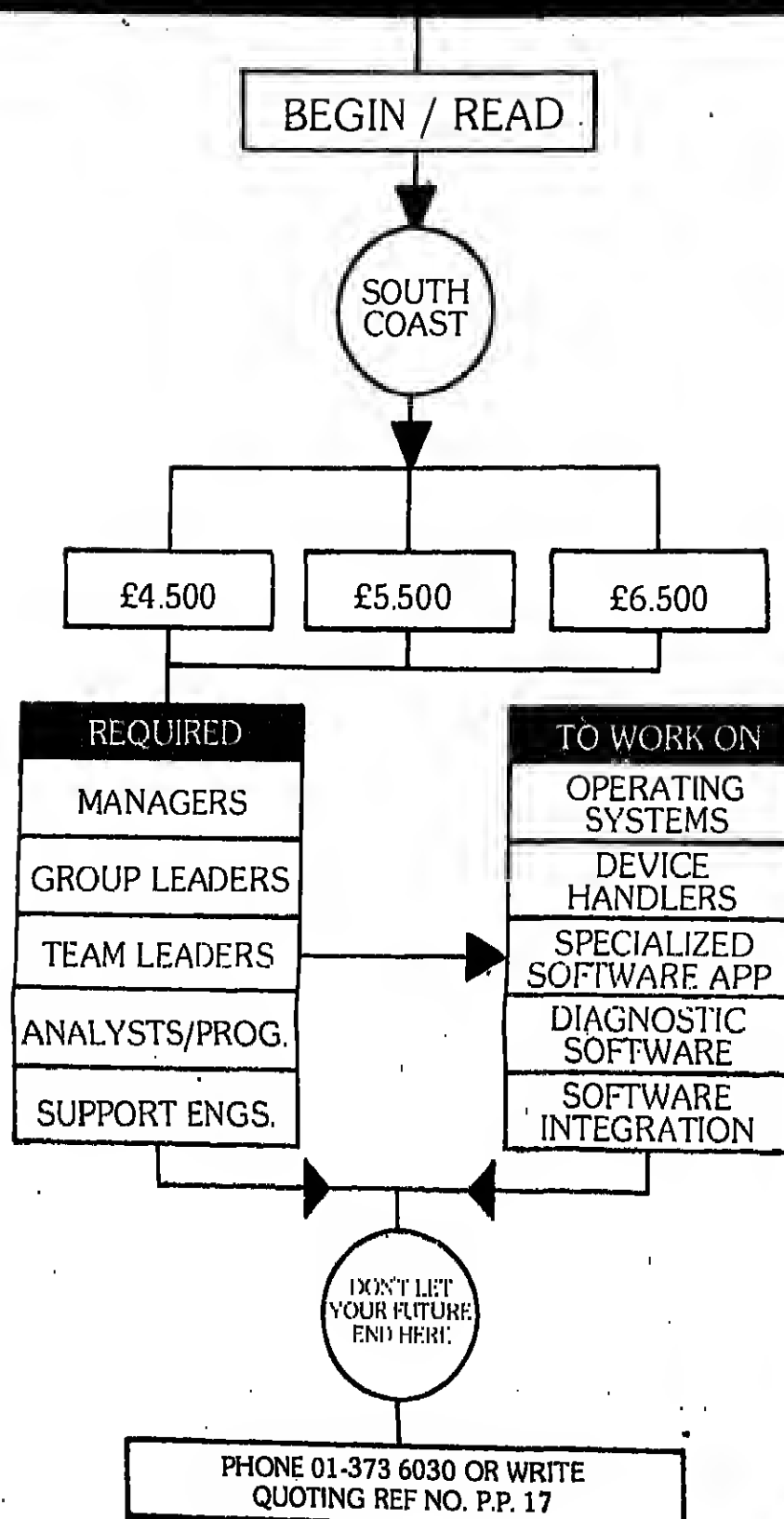
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RESEARCH ASSISTANT

A research assistant is required in the field of distributed processing and computer networks. The project involves the design and implementation of communication systems for distributed process control based on a network of PDP 11/03 microcomputers. Candidates with a degree in computer science and post-graduate experience in computer communications, distributed processing or microcomputer systems software will be particularly suited for this post.

The appointment is for 3 years. Salary on the 1A scale starting at £4,357 p.a. (under review) including London allowance and USS.

Applications, including curriculum vitae and names of two referees, should be sent to Dr M. S. Stamen, Department of Computing and Control, Imperial College, London SW7 2BZ by 30th September 1978. It is hoped to make an appointment by 1st November 1978.

Lothian Health Board University of Edinburgh

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Contact: Andy Wright

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The importance of these positions to the development group are reflected by the salaries and excellent fringe benefits, which include generous relocation assistance. Contact: Margaret Stevens

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DDE/PUNCH/VDU OPERATORS**

FORTHCOMING

**OS JCL WRITERS
IBM DOS VS POWER & GRASP OPS
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HONEYWELL OS 2000 Ops and Senior Ops and Shift
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EFFECTIA GRAVIS
NATIONAL HOUSE, 66 WARDOUR STREET, LONDON W1V 3HP
COMPUTER PERSONNEL CONSULTANTS LICENCE NO. SE(A)62
C/W 7.9.78

Exciting opportunities for experienced computer people

We are the Quarry Products Division of the Tarmac Group and a
market leader in aggregates and derived products throughout the
United Kingdom.
Our Group Headquarters will shortly decentralise the Division's
computer activities to MATLOCK and WOLVERHAMPTON and these

COMPUTER MANAGER - Matlock (Ref. RN/1)
COMPUTER MANAGER - Wolverhampton
(Ref. RH/5)

Initially the Manager will assist in the transfer of existing
systems from the controlled mainframe computer prior to
assuming responsibility for the running, maintenance and
development of these systems.
The successful applicants will have a systems and/or programming
background and several years' commercial data processing experience.

CHIEF PROGRAMMER - (Ref. RH/6)

Based at Wolverhampton he/she will head a central team in the
development of major applications and be responsible for the creation
and maintenance of standards.
The successful applicant will have experience in both COBOL
and PLAN and a thorough knowledge of disc based systems. A
knowledge of GEORGE 2+ will be an advantage.

These posts offer attractive salaries which are negotiable, fringe
benefits normally to be associated with an international group and a
company car.
To avoid undue delay in arranging interviews for shortlisted
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career details, quoting reference number, to:

Mrs. D.M. Rowa,
Recruitment and Training Officer,
Tarmac Roadstone Holdings Limited,
Roadstone House,
50, Waterloo Road,
Wolverhampton.

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If you're chasing a new job or a new contract, save time by filling in your application form here and now.

Personal Please write in ballpoint, using block capitals.

Surname _____ Forenames _____

Address _____

Tel. Home _____ Office (discretion will be used) _____

Age _____ Place of Birth _____ Car? _____

Are you prepared to relocate? _____ UK/Abroad (delete)

Experience Place no. of yrs. in box, e.g. IBM 360/370 **4**

Machines: Please specify model. **Applications**

IBM 360/370	<input type="checkbox"/>	Commercial	<input type="checkbox"/>
IBM others (specify)	<input type="checkbox"/>	Financial	<input type="checkbox"/>
ICL 1900/2900	<input type="checkbox"/>	Payroll	<input type="checkbox"/>
ICL others (specify)	<input type="checkbox"/>	Production control	<input type="checkbox"/>
Honeywell	<input type="checkbox"/>	Stock control	<input type="checkbox"/>
Univac	<input type="checkbox"/>	Scientific	<input type="checkbox"/>
Burroughs	<input type="checkbox"/>	Realtime	<input type="checkbox"/>
PDP	<input type="checkbox"/>	Software	<input type="checkbox"/>
Other mainframes (specify)	<input type="checkbox"/>	Database	<input type="checkbox"/>
		Message switching	<input type="checkbox"/>
		Communications	<input type="checkbox"/>
Other mini-computers (specify)	<input type="checkbox"/>	Data transmission	<input type="checkbox"/>
		Central process	<input type="checkbox"/>
		Teleprocessing	<input type="checkbox"/>
		MIS/CPA/PERT	<input type="checkbox"/>
		Magnetic tape	<input type="checkbox"/>
		Disk	<input type="checkbox"/>
		Others (specify)	<input type="checkbox"/>

Languages

Cobol	<input type="checkbox"/>
Plan	<input type="checkbox"/>
Assembler	<input type="checkbox"/>
PL/I	<input type="checkbox"/>
Fortran	<input type="checkbox"/>
Filetab	<input type="checkbox"/>
RPG II	<input type="checkbox"/>
Auto/easy/user code	<input type="checkbox"/>
Others (specify)	<input type="checkbox"/>

Operating Systems

DOS	<input type="checkbox"/>
OS	<input type="checkbox"/>
George (specify)	<input type="checkbox"/>
CICS/HASP/GRASP	<input type="checkbox"/>
DBOMP/MVT/IMS/CMS	<input type="checkbox"/>
Others (specify)	<input type="checkbox"/>

Job Titles

Project leader	<input type="checkbox"/>
Systems analyst	<input type="checkbox"/>
Systems engineer	<input type="checkbox"/>
Analyst/programmer	<input type="checkbox"/>
Systems programmer	<input type="checkbox"/>
Programmer	<input type="checkbox"/>
Operations supervisor	<input type="checkbox"/>
Operator	<input type="checkbox"/>
Consultant	<input type="checkbox"/>
Sales representative	<input type="checkbox"/>
Others (specify)	<input type="checkbox"/>

Position sought Please state briefly the type of appointment you are seeking.

Minimum salary £ _____ Notice required/Date available _____

Signed _____ Date _____

Cut out the whole advertisement and post to the address below.

Knight

Knight Computer Services Limited

Staff Services Division of BOC Datasolve Group and a member of Computing Services Association.

Knight Computer Services Limited, 14 Old Park Lane, London W1Y 4NL.

01-491 4706

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KNIGHT IS RIGHT

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Introducing... a new series of careers advice with **ARPEEGEETO**

the world's leading expert on **ANALYSTS AND PROGRAMMERS WITH RPG II EXPERIENCE**

If you joined them as an Analyst or Programmer you'd find yourself being asked to solve a variety of problems on one new project after another.

They particularly need people with experience of IBM machines ranging from System 32, 34 to System/3 Model 15D, and they're willing to pay very high salaries to get you if you've got ambition as well as ability.

Don't be surprised at that - Altergo is just about the most successful software group in this country. Business with them is so good, they can afford to make sure they find and keep the right people.

If you want to travel far and wide, that's great. If you'd rather stay roughly where you are now, that's OK too. Either way, there's always plenty of responsibility to be won.

Take my tip - contact Brian Walker, or Barry Whitesman quoting BS/13 on 01-734 9681 or after 8.00 p.m. on 049 481 2713. Altergo Business Systems Limited, Warwick House, 38 Soho Square, London W1V 5DP.

This week Arpeegeetoo says **'Why confine your skills to one installation when you could work on hundreds'?**

Don't you find that working for just one user soon ceases to challenge your ability?

After all, once you've sat up the system there's not much more to do than twiddle the knobs and tie up the ends, is there?

You could be using your skills on greater variety for much higher financial rewards. Take the people down at Altergo Business Systems for example.

They're professionals in RPG II work - they travel around developing and installing systems for various companies in different situations.

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Computing Services Association

May our success be with you

city of cardiff

CITY TREASURER'S DEPARTMENT

Applications are invited for the following posts. Commencing salaries will depend upon qualifications and experience.

SYSTEMS ANALYST
(Salary £4020-£5,745 + Supplement of £312)
To assist in the transition of systems from ICL 19045 to end ICL 2872 computer and to develop new systems for the ICL 2872. The successful applicant will be the senior member of a project team including a Senior Programmer and Programmer(s). Systems experience is required and knowledge of programming will be an advantage.

SENIOR PROGRAMMER
(Salary £4,481-£4,761 + Supplement of £312)
To assist a team of 5 persons in the building and maintenance of a VME/B Operating System environment and associated user support functions. Detailed knowledge of a large scale operating system is essential.

COMPUTER PROGRAMMERS
(Salary £2,987-£4,320 + Supplement of £312)
To assist in either applications programming or the provision of technical support for an ICL 2872 computer. Computer knowledge and experience will be an advantage.

The authority currently operates an ICL 19045 computer with extensive communication links and using the George III operating system. Delivery of an ICL 2872 computer is scheduled for March 1979. The computer provides computer services to the County of South Glamorgan Council, the Cardiff City Council and the Vale of Glamorgan Borough Council. 5-day, 37-hour week with Local Government Conditions of Service and Superannuation.

Removal and local expenses up to £500 payable in appropriate cases.

Application forms, obtainable from the City Personnel Officer, Telephone No. Cardiff (0222) 31003 extension 434, to be returned by 15 September, 1978.

THACKRAY

SYSTEMS ANALYST

Production Control Applications

We are a leading U.K. manufacturer and distributor of surgical instruments and theatre equipment based in Leeds.

We operate a large Burroughs B1700 which is running on line real-time commercial systems and we require additional Systems Analysts to join our existing team and work chiefly on Production Planning and Control applications.

The successful candidate will have a good knowledge of COBOL and at least two years successful system experience.

This position offers good career prospects and a 40% of employment, including a system of flexible hours. Relocation expenses will be paid where appropriate.

Please write or telephone for an application form to Group Personnel & Training Manager.

Chas. F. Thackray Ltd., St. Anthony's Place, Leeds, LS11 8DT.
Tel: Leeds (0532) 700461.

Join Data General Software Professionals

We need additional professionals

Data General's Systems Engineering Group needs new Support Analysts. They will join a professional team providing technical support for our sales efforts on our systems including those using our new M600 Mini computer.

You'll be joining a totally committed industry leader who believes in giving clients a professional service from the word 'go'. That's what has made us the world's fastest growing company in the business with more than 50,000 installations world-wide. The M600 will cement our position even further.

Broaden your horizons

You'll be working from Manchester, Bristol, Birmingham or London. If you're a Systems Analyst with your feet firmly planted in one boring spot - this is the ideal opportunity for you to broaden your horizons.

You'll get a generous salary. A company car and automatically participate in our incentive scheme. Naturally, we will provide assistance with re-location expenses if necessary.

Broaden your knowledge

You'll be into every type of industry and business... commercial Data Processing, on-file inquiry, communications, instrumentation and control and so on. You'll work with advanced compilers and teleprocessing software. You'll be fully trained in the UK and at our Boston, Mass. HQ.

Are you good enough for the team?

Naturally, we'd like to know what you've been up to so far... and where you see your career going. You must have in-depth experience of software from either an advanced applications or systems programming background. You should have the personality to get on with clients and be able to talk commercial problems with them.

Where to go from here

EITHER Telephone Janet Field on 01-578 9231 on Thursday or Friday
OR Attend an informal interview at one of these locations:

Monday, September 11th
Holiday Inn, 134 George Street, Marble Arch, London W1. between mid-day and 9.00 p.m.

Tuesday, September 12th
Holiday Inn, Langley, Slough, Berks. between mid-day and 9.00 p.m.

Wednesday, September 13th
Excelsior Hotel, Manchester Airport, Wythenshawe, Cheshire. between mid-day and 9.00 p.m.

Thursday, September 14th
Holiday Inn, Old Market, Lower Castle Street, Bristol, Avon. between mid-day and 9.00 p.m.

Friday, September 15th
Holiday Inn, Holiday Street, ATV Centre, Birmingham, Warwick. between mid-day and 9.00 p.m.

Data General

Data General Limited, 3rd & 4th Floor, Hounslow House, 724/734 London Road, Hounslow, Middlesex TW3 1PD. Tel: 01-572 7455.



APPLICATION PROGRAMMERS

To AU\$16500

ESSENTIAL QUALIFICATIONS:

Minimum 3 years assembler programming with airline ACP based applications experience.

Degree/Diploma in computing or other appropriate qualification.

THE JOB:

Participate as appropriate in system specification, design and programming real time applications.

Assist user department personnel in producing functional specifications and the introduction of new systems.

APPLICATIONS:

Interested persons wishing to pursue their profession in a new environment are invited to apply in writing stating personal details, educational qualifications and career experience to:

Mr R P Watson,
Acting Personnel Superintendent, Europe,
Qantas Regional Headquarters,
500 Chiswick High Road, W45AW

Interviews will be conducted in London from 25/9/78 to 29/9/78. Evening appointments can be arranged if necessary.

Successful applicants will be required to undergo normal immigration processing through the Australian migration authorities.

WILTSHIRE COUNTY COUNCIL
WILTSHIRE COLLEGE
Lecturer in
Computing, Statistics
and Mathematics
A qualified teacher is required for the post of Lecturer in Computing, Statistics and Mathematics. The successful candidate will be responsible for the teaching of these subjects to students. Applications should be sent to the Director of Studies, Wiltshire College, 100, The Avenue, Tisbury, Wiltshire SP13 3QD. Applications should be sent to the Director of Studies, Wiltshire College, 100, The Avenue, Tisbury, Wiltshire SP13 3QD. Applications should be sent to the Director of Studies, Wiltshire College, 100, The Avenue, Tisbury, Wiltshire SP13 3QD.

UNIVERSITY OF BRISTOL
Applications are invited for the post of
TEMPORARY
EXPERIMENTAL
OFFICER
The University of Bristol is seeking a person to carry out a temporary post of Experimental Officer. The successful candidate will be responsible for the operation of the University's experimental facilities. Applications should be sent to the Director of Studies, University of Bristol, 100, The Avenue, Tisbury, Wiltshire SP13 3QD.

Are you interested in:

- An attractive salary
- A new life style in a warmer climate
- Opportunities to travel
- Challenging work

If so, several positions are available for suitably experienced Assembler Programmers to join our project teams in Sydney and become actively involved in a major program of development for our real time passenger reservations and airport handling systems.

COMMENCING SALARY: In the range AU\$14500-AU\$16500 according to experience.

BENEFITS INCLUDE: Generous air travel concessions and a contributory superannuation plan after 12 months service.

RELOCATION: Realistic assistance provided. Details will be supplied on request.

Opportunities for Programmers

Central Scotland c.£4,500

Our client, a highly successful international company, is heavily committed to the expansion of its computer systems and facilities.

The IBM 370/125 equipment has recently been expanded to include highly sophisticated on-line systems, and future applications include on-line order processing and costing systems.

These career opportunities will be of interest to energetic programmers with at least 18 months experience in BAL or COBOL, under DOS. The successful candidates will be ambitious self-starters who are keen to join a stimulating environment.

Conditions of employment are good and include a realistic salary along with other fringe benefits expected of a large, progressive organisation.

Please write, giving details of career to date, and quoting reference R42263 to:

The Manager,
Confidential Reply Service,
MCS/ROBERTSON & SCOTT,
MCS House, 23 Park Circus, Glasgow, G3 6AS.

All letters will be opened, acknowledged and forwarded to our client. Please list separately any companies to which your application should not be sent.



Data Processing Consultants

£6,000 - £10,000

London/Manchester

BIS Applied Systems Limited is a member of the Business Intelligence Services Group which employs more than 300 staff in data processing consultancy, systems development, data processing education and market research. The Group has provided DP services for 14 years, and has annual revenue running at a rate in excess of £5 millions.

BIS Applied Systems Limited is a company specialising in DP consultancy and DP education. With its broad client base including 31 of the top 60 companies it covers all industry classifications. To enable us to continue our successful growth rate we require consultants to work on a wide range of assignments.

As a member of our consultancy team you would be involved with projects such as:

- ☐ Long term system and DP strategy planning
- ☐ Data base design
- ☐ Real time and communications networks design
- ☐ Evaluation of mini computers and distributed intelligence systems
- ☐ Structural design and programming
- ☐ Design and introduction of DP management control systems
- ☐ Hardware and software selection
- ☐ Systems implementation
- ☐ DP training

Career prospects are excellent within this expanding company and opportunities exist to work within a variety of computer installations. Candidates must have demonstrated the ability to achieve results in their career to date and should be good communicators.

BIS Applied Systems staff receive benefits including:

- ☐ Profit-linked bonus scheme
- ☐ Insurance and long term sickness scheme
- ☐ Contributory pension scheme
- ☐ Season ticket loans and luncheon vouchers

Assistance towards relocation can be provided.

If you are interested and can demonstrate technical, project oriented or management achievement in your DP career to date, why not telephone or write for further details to Margaret Tallant (London) or Gerry Richings (Manchester) at the addresses below, quoting reference R4225.

BIS Applied Systems Limited,
York House, 180 Westminster Bridge Road,
London SE1 7UT.
Telephone 01-633 0866

BIS Applied Systems Limited,
Quay House,
Quay Street, Manchester.
Telephone 061-831 7031



Wrangler

COMPUTER OPERATOR

Due to internal promotion, Blue Bell Apparel Limited, manufacturers of Wrangler Leisure Wear have a vacancy for a computer operator. We are looking for someone who has an interest in programming and one/two years' experience of an IBM System 3 or similar commercial computer. You will become part of a small and friendly team which will be subjected to frequent pressure and be expected to work without supervision. We currently operate a two shift system - day and evening. Remuneration and other terms of employment are commensurate with those of a large rapidly expanding international company. Applications to Mr Alan Osborn, Personnel Manager, Blue Bell Apparel Ltd., Colverton, Nottingham.

COMPUTER PERSONNEL APPOINTMENTS LTD.
Career Specialists and Consultants for
D.P. MANAGERS, SYSTEMS ANALYSTS,
PROGRAMMERS AND OPERATORS
Midlands, Northern Counties and Scotland
For application forms apply to:
66 New Street, Birmingham B2 4DU. 021-443 0361
or Tel 011 723 6334

UNIVAC 1100 OPERATORS

CRC Information Systems Ltd, at Slough has an expanding 1100 configuration including 14x8434, 5x8430, 5xU16. Operating in a TIP/DMS environment hosting a comms network. To strengthen the current team experienced top grade staff are required for the post(s) of:

Senior Operator/
Shift Leader

Salary at £4,600/£5,200 including s.e.

If you can organise and train staff and implement methods of documentation and control, prospects of further promotion are good.

Apply in confidence to:

Alan Hutchby
750 Deal Way, Slough SL1 4SH
Tel: Slough 37011

MYRIAD APPOINTMENTS LIMITED

Computer Personnel Consultants

SENIOR SYSTEMS ANALYSTS

to £8500

KENT

A senior systems analyst with sound experience in commercial systems design and project control is required to augment an active team in Kent.

It is essential for candidates to show proven ability in scheduling and controlling a team working to good standards supported by comprehensive documentation. A background in programming would be an added advantage.

The successful applicant will be involved in unusual and interesting applications and will have the personality to establish good working relationships with user department personnel at both junior and senior level.

Conditions of employment are excellent, salary is negotiable dependent on experience. A comprehensive relocation package is available where necessary.

Ref E1/0709

PRODUCTION MANAGER

S. LONDON

Non-shift

c £5000

This is an excellent opportunity for someone, currently engaged in either computer operations or data control, who is seeking wider experience and promotion into a managerial capacity.

The successful applicant will manage three teams (data preparation, data control and operation) and ensure the smooth flow of production work through a busy data centre. A solid computer background and a strong personality will be needed, since he/she will provide the initial user interface, advise on additional terminal equipment (minis are under consideration) and organise for the expansion of the department and the setting up of a fourth team.

The Company is one of the most successful service organisations in Europe with users being served by a network linking major cities in the U.K. and the Continent.

Ref. N2/0709

CHUBB ELECTRONICS

IF YOU HAVE SECURITY IN MIND, THERE'S A FUTURE WITH CHUBB

Chubb Electronics was formed by the grouping of four highly specialised companies - Chubb Alarms, Chubb Integrated Systems, I.C.C. Machines and Gross Cash Registers. As a result, Chubb can offer some of the most advanced and effective electronic security and cash handling systems in the world today. Chubb rely on top calibre personnel and with the mood of expansion in the air, we are able to offer more opportunities combining challenge, security and career development.

At CHUBB ALARMS we specialise in integrated security and building control systems and we are currently looking for more people to strengthen our young professional team working in a commercial environment.

PROJECT EXECUTIVE

The role is to assist in commercial negotiations for integrated security systems and to project manage system implementation to which you will need some experience of systems engineering or project management, together with an HNC in electronics, as a minimum.

PROJECT SPECIALIST - COMMISSIONING

The requirement is for an experienced engineer to undertake commissioning of hardware/software for computer and microprocessor based security and control systems. A good practical background together with a degree, HNC in electrical/electronic engineering or equivalent is sought for this appointment which also involves considerable site work in both the U.K. and overseas.

SOFTWARE SYSTEMS ENGINEER

This position, in our services section, will interest a young, enthusiastic person where the opportunity is provided for involvement on a wide variety of system projects. The responsibilities revolve around system assembly, programming and test for a wide range of computer and microprocessor control systems, requiring some practical experience of assembler programming. Further training will be provided where necessary.

PROJECT ENGINEER

Working as an integral part of the project team for integrated security systems, your job will involve system specification, preparation of tenders and assisting in the implementation of multifunctional systems. The successful candidate should hold a technical qualification preferably at HNC level and be capable of quickly understanding complex systems.

DRAFTSMAN

We have in mind an experienced person who is used to working on their own initiative, to provide installation and systems drawings and support to project teams and engineering staff. Some commercial art experience, although not essential, would be an advantage.

GRADUATE TRAINEE

Our need is for a recently qualified engineering graduate, with an electronics or computer science degree, to work with our team on integrated security, fire and environmental control systems. Training in systems engineering, project management and commercial services will be given.

These appointments are open to both male and female applicants. The salaries reflect the importance of the positions and in addition some appointments carry the benefit of a company car. Promotional prospects within the Group are extremely good.

To apply write with full details of experience to MARILYN OAVISON, COMSYTE SERVICES LTD., Suite 74-76, Henrietta Street, London, WC2E 8LH.

POTENTIAL ANALYSTS SALES SUPPORT

Near CROYDON

To £6000

This is an excellent opportunity for experienced COBOL programmers to progress to Analysis and play an active part in the development of systems from feasibility to implementation.

The successful candidates will have the opportunity of gaining client liaison experience and the range of activities will extend to both pre- and post-sales situations. The more senior positions will give opportunities for project leadership.

The Company operates a large D.P. Centre and have a full development programme which will afford experience in three Database systems. Excellent commencing salaries will be offered and are enhanced by first-class conditions of employment including 4 weeks' holiday, restaurant and social club.

Ref. N1/0709

ANALYST/PROGRAMMER

N. LONDON

New Systems

To £6500

This is an excellent opportunity for an experienced Analyst/Programmer who now wishes to hold responsibility for the development of an interesting variety of new systems.

The successful candidate will be involved with feasibility studies and play a predominant role with the development of new systems through all stages of implementation.

Candidates should have several years' COBOL Programming experience gained on any machine. An IBM background would be a distinct advantage.

The Company provides first-class conditions of employment and is planning a major upgrade in hardware to cope with a number of on-line systems throughout its UK and European outlets.

Ref. N3/0709

24-hour answering service

Please telephone for a confidential discussion or write to:

30 Fleet Street London EC4Y 1AA
01-353 0981

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£3800 to £4700
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£150 to £400 p.w.
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to £6,000 (inc. occasional shifts)

COMPUTER OPERATOR

to £4,280 (inc. shift) plus overtime.

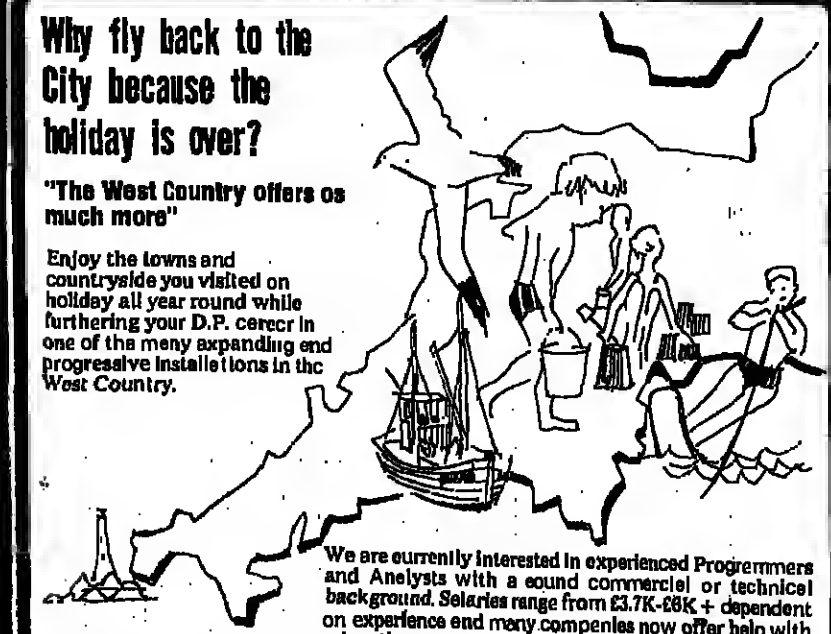
Fishburn are acknowledged leaders in the field of printing inks and in line with current expansion and internal promotions now need to recruit two additional computer personnel to work in the operations side of a 370-115 (288K, 3340s local and remote terminals) on a 2 shift system.

For the senior position we need someone fully conversant in DOS/VS and POWER/VS and who can actively supervise other personnel including a small punch room and perform scheduling and data control functions.

Ideally, the junior position will be filled by a younger person with about one year's experience of DOS/VS or in fact a trainee capable of expressing potential for the future.

In return for the skills we need we can offer the right men or women an interesting future in a good local job with genuine career development prospects. The attractive salaries are complemented by a range of benefits including a productivity scheme, 4 weeks holiday, holiday bonus and subsidised canteen.

Contact P. Chatterton our D.P. Manager at
Fishburn Printing Ink Co. Ltd., 94 St Albans Road,
Watford, Herts. Tel: Watford 28282.



WALKER-WESTON ASSOCIATES LIMITED
WOODLANDS, LOWER BRISTOL ROAD, BATH, AVON BA2 8ES
Telephone: BATH 217880 (4 lines)

MYRIAD MANAGEMENT CONSULTANCY SYSTEMS AND PROGRAMMING BACKGROUND

c £8,000

Ambitious Systems and Programming professionals frequently seek more than a high reward for their skills. Job satisfaction, increasing responsibility and the continual enhancement of technical and business skills are all of prime importance.

The opportunity to work independently, planning your own day, scheduling your client visits, preparing detailed proposals and carrying out assignments are all part and parcel of a consultancy position with Myriad.

Recruitment of specialised computer personnel is a new profession, as was programming a few years ago, and as then, the concerns to the future, technical involvement, leaving the machines and systems you know so well, still remain.

Like any successful business Myriad can offer a great deal more than a future in recruitment consultancy. The ability to react to client oriented situations, deal with people of all levels and backgrounds make this an excellent training ground for a more responsible business role. Certainly few opportunities offer the challenge, reward and career potential as a Company having achieved an outstanding record of growth over the last four years.

Formed in mid 74 Myriad has doubled both turnover and size each year and provides a friendly professional environment in an attractive location in Central London. An excellent salary package is offered together with good conditions of employment.

Ref: M1/0709

MYRIAD APPOINTMENTS LIMITED Computer Personnel Consultants
Telephone or write to:- 30 Fleet Street London EC4Y 1AA 01-353 0981 (24 hrs)

PAPWORTH INDUSTRIES DATA PROCESSING MANAGER

Nr. Cambridge

c. £5000

Papworth is a settlement dedicated to the rehabilitation and employment of handicapped persons. It is located in a rural setting, 10 miles from Cambridge and within easy access of the main A1 and A45 trunk routes.

We require an experienced computer professional to take complete control of all our ICL 4903 site. This will involve consolidating current in-house systems and expertise plus future development of the installation to take on bureau facilities.

If you have experience of:-

ICL Equipment
RPG2 Programming
Systems Analysis/Design
Managing a project team

We can offer:-

Scope for initiative
Solid management experience
Excellent career progression
Pension scheme
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Apply, in confidence, giving details of age and experience, to:-

Mr. A. Poole
PAPWORTH INDUSTRIES
Papworth Everard
CAMBRIDGE CB3 8RG

Operations opportunities in the Lake District

Operations Team Leader (inc. from £6000)
Computer Operator (inc. from £4940)

We are looking for two experienced men or women to join our Operations Department in Penrith, Cumbria, where we operate a 2mb 2880 under GEO3 DME. It will run under VME/B at some future date and provide, over two shifts, a service to users in various parts of the country via a large communications network.

Because of our Lake District location we are highly self-sufficient and are therefore only interested in hearing from people who can make an immediate contribution to the successful running of the installation.

Applicants should have a minimum of two years GEO3 experience for the Operator position and also Shift Leader experience for the OTL position.

We offer:-

- * bonus schemes in addition to basic salaries
- * genuine career opportunities
- * employment in a custom-built Computer Centre
- * progressive training on 2800 equipment
- * above mentioned minimum salaries, inclusive of shift allowance and 40 hour week allowance
- * usual benefits associated with a large multi-national company
- * relocation expenses will be provided where necessary.

Contact: Mr. J. C. Hodgson, Regional Controller
BICC Limited, Regional Computer Centre
Gillwilly Industrial Estate
Penrith, Cumbria.
Telephone: Penrith 6801

BICC

COBOL Programmers for the development of advanced business systems £5,000-£7,000

Business information systems in Shell's Central Offices are big, interesting and demanding. They are important in many aspects of our world-wide oil trading, chemicals, natural gas, marine, group information and accounting, and other business activities. They grow and change as rapidly as our industry; in consequence we are looking for high calibre programmers. They will have an important and responsible role in the development and support of new systems in Shell. By their nature, these systems require the use of advanced techniques, such as data base and on-line programming in an IBM VS environment.

Initially the new programmers will work at Shell Centre in London, where they will join relatively small and technically self-sufficient groups, organised mainly on a user and project basis. However, interesting assignments arise overseas and elsewhere in the U.K. for which they could be considered. Opportunities also exist for work involving programmer supervision and systems design together with progression to business analysis for those people showing the necessary initiative and skills.

We invite applications from programmers who have at least two years' practical experience of COBOL. The starting salary will be in the range £5,000 to £7,000 per annum, including London Allowance. We offer first class conditions, including an excellent pension scheme, varied sports and social amenities and other benefits. Where appropriate, assistance will be given with relocation expenses. Please write or telephone for an application form to:

Shell International Petroleum Company Limited, Recruitment Division
(C12) PNEL/21, Shell Centre, London SE1 7NA. Telephone: 01-934 2495.



NORTHERN RECRUITMENT FEATURE

Advertisers are reminded that the next Computer Weekly area feature will be published on September 28 and will highlight career opportunities in the North.

Space reservations should be made as soon as possible to:

Owen Kelly — Manchester — 061-872 4211
Eddie Farrell — London — 01-261 8097

Copy Deadline: PM Friday before

COMPUTER WEEKLY
THE INDUSTRY'S WIDEST READ AND MOST REQUESTED NEWSPAPER

SENIOR PROGRAMMER

Salary range c. £5,500-£6,000 p.a.

A centralised signalling control system is currently being implemented on a dual DEC 4880 installation for the Northern and Victoria Lines. We need a Senior Programmer to work as a member of the implementation project team producing the application software.

Experience in real-time systems is essential, but applicants must also be able to demonstrate at least three years' proven practical experience in programming in both high level and assembler type languages. An appreciation of systems analysis and design techniques is very desirable. A qualification leading to membership of a recognised appropriate institution or Society is also desirable.

If you are interested in this opportunity write to Staff Appointments and Development Officer (Ref. 354/C) London Transport, 65 Broadway SW1H 0BD, or Phone 01-222 6600, ext. 525.



ENGINEERING CONCESSIONAIRES LTD. ANALYST/ PROGRAMMER D.P.M. DESIGNATE INITIAL SALARY C.£5,000

We are a young, dynamic and progressive company wishing to recruit an analyst/programmer with four or more years' experience in processing experience to plan, control and ultimately manage the installation of an IBM System/34 Computer.

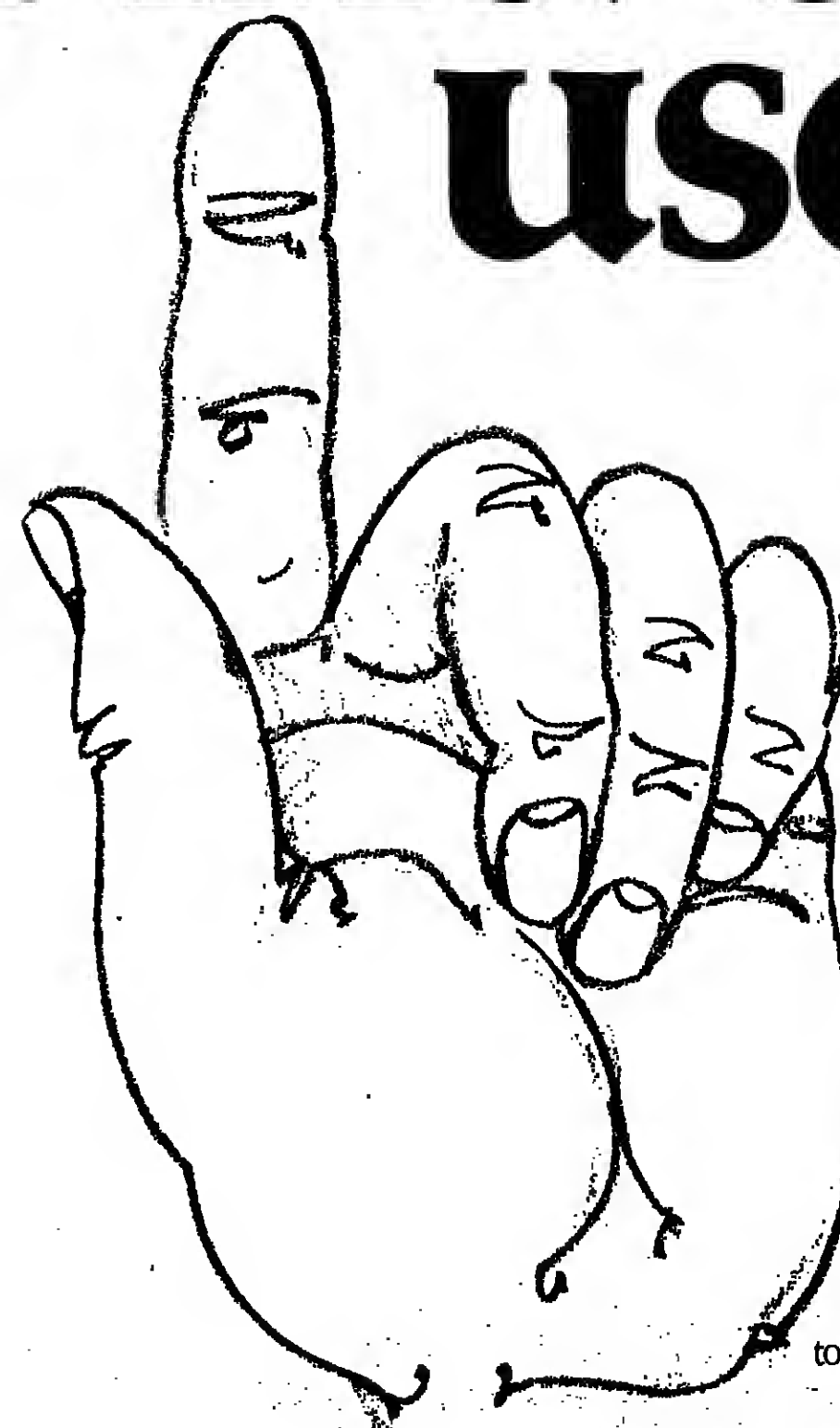
Preference will be given to applicants possessing relevant IBM experience, although a sound knowledge of analytical techniques, coupled with a good understanding of RPG is most important.

As part of a large group of companies we are in a position to offer genuine career prospects, therefore the successful applicant can expect plenty of freedom to develop his/her own talent.

Re-location expenses will be taken into consideration.

Please send applications, in writing, to:
The Accountant, Engineering Concessionaires Ltd.,
141A Avenue, Sandyford, Leeds, CV9 2DP.

Find out... use your index



Here's something for you to mull over.

We're a leading petrochemical contracting company making varied and extensive use of computers. Our Programmers and Analyst/Programmers get invaluable experience on stimulating and demanding assignments. And quite simply we'd like you to phone us on the dates mentioned below to find out more and to arrange an early interview.

Analyst/Programmers - £6,000 to £6,500

With 3/4 years' COBOL experience on IBM equipment and an understanding of OS/JCL, who want to get involved in a commercial environment.

Programmers - £5,000 to £5,500

With a minimum of two years' experience of COBOL together with a working knowledge of OS/JCL and utilities.

Use your index. Dial 01-903 8484. Speak to Ian Kydd on extension 3865 or John Wallis on extension 3857 between 9am and 8pm on 7th, 8th and 11th September.



Pullman Kellogg Limited,
The Pullman Kellogg Building,
Stadium Way, Wembley HA9 0EF





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ALTRINCHAM, CHESHIRE
TEL: 061-828 8288/841 4800

CHESHIRE

PROGRAMMERS (Min. 12 mths. exp.)
to £5½K

PROGRAMMER ANALYSTS (Min. 2 yrs.)
to £6½K

PROJECT LEADERS/MNGRS. (Min. 5 yrs.)
to £7½K

We challenge YOU to meet our client's stringent requirements and fill one of the above well-paid positions.

The hardware you have worked on is irrelevant but you should have a good knowledge of COBOL.

Company benefits include a pension scheme, four weeks' holiday, generous expenses, excellent training, and re-location expenses where applicable.

CONTACT Jill Jones or Ron Vipond NOW!
Evenings/Weekends Jill, 061-881 2551
Ron, 061-904 0188



Agency Licence Number NW 419

68 COMPUTER SERVICES..
CWS Computer Group

Senior Systems Analysts Systems Analysts Senior Programmers Programmers Manchester Based

CWS Computer Services satisfies the total data processing needs of the £1,400 million turnover Co-operative Wholesale Society Limited and its subsidiary companies. It provides computer services to Co-operative Retail Societies and other commercial organisations through its six regional Computer Service Centres.

A planned expansion of the Computer Group Software Department has led to vacancies for Analysts and Programmers to work on a variety of development projects for Manufacturing, Warehousing and Distribution and Accounting systems. Many of these development projects include the use of terminals linked to one of the Group's main-frame computers.

Competitive salaries will be offered to the right applicants with relocation expenses where appropriate. If you would like to discuss these opportunities telephone: Peter Griffiths, Systems Manager ext. 6828, Tom Wilson, Programming Manager ext. 8848 or write giving full career details to Bobbie Buchanan, Computer Group Personnel Officer, CWS Limited, P.O. Box 53, New Century House, Manchester M60 4ES. Tel: 061-834 1212.



CWS MAINFRAMES

Manchester 2 x ICL 1904S
(shortly to be enhanced
to 3 x ICL 2960)
Glasgow ICL 2904
Ipswich ICL 2904
Nuneaton ICL 2904
Birtley ICL 1902T
Godalming ICL 1904A
Liverpool ICL B959

68 COMPUTER SERVICES..
CWS Computer Group

Computer Operations Manager

West London c. £8500 + Car

Our client is the UK subsidiary of one of the world's largest chemical and pharmaceutical companies. Their UK headquarters are in Hounslow, close to London airport where their mainframe computer complex is based, providing their UK operations with sophisticated data processing facilities using interconnecting teleprocessing links.

The service is provided by a 1 megabyte IBM 370/148, operating under OS VSI using CICS and IMS DB, with 3333 disks and 3420 tapes. At the present time the computer is operating on a three shift 24 hours per day basis. To manage and develop these data processing facilities the company now needs to appoint a Computer Operations Manager.

The successful applicant will be responsible for the day to day running of the computer centre and its staff of 30 which includes the operating, data preparation and production control personnel and a hardware specialist. He/she will also be responsible for the control, budgeting, security, planning and staffing of the centre together with participation in the evaluation of future hardware requirements and their effective implementation.

Suitable candidates will possess in excess of five years operations experience on IBM 370 equipment, the last three years being in operations management. Ideally the candidate will be at least 28 with a solid academic record. A good personality, management and leadership skills with the ability to motivate others coupled with a sound knowledge of IBM 370 on-line systems under OS using database techniques are essential.

This is a senior management appointment and requires strong technical and personal qualities; it is a rewarding and challenging role, offering a substantial range of fringe benefits including:-

- A good pension and life assurance scheme
- Free medical and permanent health insurance
- A subsidised restaurant
- Discount purchasing facilities on household and personal famous brand name goods

A generous relocation package will be offered if applicable.

To discuss this challenging career opportunity in more detail, telephone Yvonne Warren or write in strictest confidence quoting Ref. YW 1372.



Lloyd Chapman Associates

123, New Bond Street London W1Y0HR 01-408 1670



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£150 to £300 per week (plus expenses where applicable)

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Assembler/COBOL
ODS/VS - COBOL
COBOL
S/3 RPGII + CCP

Cheshire
Cheshire
North East
West London
London
Norway

min. 3 months
3 months
min. 3 months
3 months
min. 3 months
3-6 months

ICL

System 4 USERCODE
2800 VME COBOL + Database
2803 COBOL
1800 Plan
1800 COBOL + Comma. Mgr.
1800 Plan + COBOL
2803 COBOL
1800 COBOL

Merseyside
Luxembourg
Amsterdam
Scotland
West Midlands
Gloucester
Worcester
North West

6 months
6-12 months
int. 2 months
3 months
6 months
3 months
6 months
Various

OTHER

Singer 10 or 1500 exp.
Singer 1500 Assembler
Univac Assembler/COBOL
PDP BSX11-CORAL 68
DEC DIBOL
PDP BSX11
PDP Basic+

Scotland
London
North East
North East
North West
Iran
Various

min. 3 months
4 months
min. 3 months
3 months
6 months
6 months
min. 3 months

Contacts: North: Ron Vipond - John Christian
South: Sara Smith

Evenings & Weekends

Ron: 061-904 0188
John: 061-841 4000
Sara (Daytime only): 061-841 4000

Agency Licence Nos: NW418 SE/A/2648



Computer Operations - Shift Leader

up to £4600 + shift allowance

to supervise and co-ordinate a Senior Operator and 4 shift operators working on ICL 1904S and 2970 computers.

Applicants must be educated to at least 'A' level standard and have 5 years' plus operating experience on a third generation computer, including some experience of the ICL 2900 machine.

Starting salary will be up to £4600 plus shift allowance, but more could be paid to candidates with

exceptionally relevant qualifications or experience.

Excellent employment conditions include a non-contributory pension, canteen service, extensive sports and social facilities and assistance with relocation where appropriate.

Please write or telephone for an application form to: Brian Kirtin, Staff Officer, BP Chemicals Limited, Seaway Parade, Port Talbot SA12 7BP. Tel: Brian Forry (0639) 812341, ext. 0240.

BP chemicals



FORTRAN PROGRAMMER

Up to £5,000

A growing firm of building and civil engineering contractors requires a Fortran programmer to join an established team concerned with writing, developing and maintaining computer programs for a variety of engineering applications.

In house computer facilities, including mini-computers with associated plotting and graphics display peripherals, are at the disposal of the program development team.

The successful applicant should have experience in writing FORTRAN programs, preferably using mini-computers, together with the ability to work efficiently with a minimum of supervision.

The appointment, which is based in London offers the usual advantages expected from a large organisation and is open to men and women.

Replies to Box No. 1980, Computer Weekly, Room 118, Dorset House, Stamford Street, London SE1 9LU.

METROPOLITAN BOROUGH OF Rochdale

Treasurer's Department (Computer Section)

SENIOR PROGRAMMER

80.1 £5,232-£5,888

Rochdale is situated 11 miles north of Manchester on the edge of open moorland.

The Council has ordered an ICL 2980 system for delivery in September, 1978. The machine and staff will be housed in purpose-designed accommodation in new municipal offices. The present installation comprises an ICL 64K 1902T with tapes, discs and communication equipment.

The successful candidate will lead a team of five programmers in continuing development and maintenance work and the preparation of existing work for the 2980 installation. Knowledge of 1800 COBOL, Plan and communication systems will be an added advantage.

Assistance with removal expenses and housing accommodation will be given in appropriate cases.

Further details may be obtained by ringing Rochdale 47474; Ext. 722, Mr. Wright.

Application form available (by quoting Ref. No. 8.811) from the Principal Personnel Officer, 18 Drake Street, Rochdale OL18 1XG, to whom replies should be returned by 21st September, 1978.

DP Manager

Croydon, £8,000 + car

The holding company of a profitable group engaged in chemical, pharmaceutical and mineral manufacturing, processing and distribution requires a manager to assume full responsibility for its ICL System 10 installation. Previous DP management experience is not essential but candidates should be seasoned professionals.

aged 28 plus, and will have had responsibility for the design and implementation of commercial applications. They must also be capable of advising on the development of DP facilities throughout the group. This is a key position offering a competitive salary and benefits plus excellent career prospects.

E. Sutton, Ref: 17027/CW.

Male or female candidates should telephone in confidence for a Personal History Form to: LONDON: 01-734 6852, Sutherland House, 516 Argyll Street, W1E 6EZ.



BIRMINGHAM, CARDIFF, GLASGOW, LEECS, LONDON, MANCHESTER, NEWCASTLE and SHEFFIELD.



CONTRACT PROGRAMMERS

For contracts throughout the U.K. & Europe
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PERMANENT REQUIREMENTS (SOUTH)

Location	Job	Salary
City	RPG II Programmer	£5K +
Surrey	Analyst - Excellent Benefits	to £6.25K
C. London	Programmer - Basic + RSTS	to £6.5K
Herts	Programmer - PL/1: DOS	£ Neg.
City	Analyst - Lge. Commercial Sys.	£ 6K
Surrey	Analyst Programmer - COBOL	£ 5.8K
Wilts	Analyst - Insurance Exp.	£ Neg.
City	Snr. Programmer - PL/1	to £7K

We always have a number of clients with vacancies for programmers and analysts of all disciplines, so if you're looking for a change:-

CONTACT Marilyn Osvidson - NOW

Agency Licence Number SE/A/2648



COMBYTE SERVICES LTD.
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061-828 8288/841 4800

PERMANENT REQUIREMENTS (NORTH)

OPERATIONS

Dep. Ops. Mgr. IBM 3/15
Operator 8 mths. exp.
Operator 12 mths. IBM 370/125

M/CR
Leeds
Lancs.
£NEG
£8K
£3.4K

PROGRAMMERS

2/3 yrs. - H.P. COBOL or Basic. Ass.
1 yr. IBM or ICL 2903 - RPG/COBOL
2/3 yrs. IBM 370/80 - PL/1 - DOS/VS
PDP11 - RSTS - RSX/11M
PDP - RSTS Basic+

Lancs.
N.M./CR
W./Ches.
M/CR
M/CR
£NEG
£3.5-£4.5
£6K
£6K+Car
£NEG

ANALYST/PROGRAMMERS

18 mths. Prog./Syst. IBM 370/ICL 1900
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18 mths. PDP 11/70 - COBOL or CORAL
IBM 370/115 - OS/VS - RSE80/VS - COBOL

Yorks.
M/CR
Leeds
Bolton
To £5.5K
£NEG
To £5K
£NEG

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Supp. Anal. 5 yrs. exp. Sys. 10 or 2803/1800
S/ Sys. - Prog. Lead. S/ Sys. Orgs.
S/ Prog. 3 yrs. exp. Asst/COBOL - Minis

M/CR
N.M/CR
L'pool
£5K
To £6.8K
£4.5K

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Computer Bureau Sales
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Pre-Sale - Large Mech. Finance 8/Group
Sales Exec. Comm. Mini Comp

Yorks.
Ches.
Ches.
Ches.
£5K+Car
£6K+Car+Exp.
To £8K
£2K

These are just a few of our current vacancies. If you are seeking a change and wish to discuss these or others:

CONTACT: Jill Jones or Ron Vipond Now
Evenings/Weekends - 061-881 2551

Weekdays Jill - 061-881 2551

Agency Licence Number NW418



Trainee Computer Programmer

Prised Central Reservations
of Ealing, London W.5, handles
bookings for over 850 Travel Houses
Hotels worldwide on an IBM 3790 System.
We are now expanding our data
programming department and have an
opening for a Trainee to assist our Data
Programmer.
The person we are seeking will be
educated to 'A' level standard and preferably
have completed an introductory
course in computer programming. Full
training will be given.
An excellent starting salary is offered and
there are good promotional prospects.
Fringe benefits include discounts on
package holidays/hotels, consumer
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scheme.
For an application form, please telephone
or write to Vivien Collins, Personnel
Officer, Travel Houses Forth Hotels
Limited, Paramount House, 71-75
Uxbridge Road, Ealing W.5.
TEL 01-679 9101



PERMANENT VACANCIES

SNR. SYSTEMS PROGRAMMER

C £6,700
Full experience in some of the following: BAL, BOS/VIS, TP Monitor or Data
Base Software, and the ability to evaluate new packages and advise on the
most effective use of hardware/software. Ref 85

TRAINEE SYSTEMS PROGRAMMER

C £5,500
An experienced COBOL/Assembler programmer to train as Sys. Prog. for
the banking concern. 370/138 BOS/VIS, CICS, POWER/VIS, JCL, and
benefits. City, E.C.2. Ref 304

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to £7,500
A fully experienced individual capable of dealing with all the responsibilities
of a 370/138 systems programming function in a busy installation
running CICS, BOS/VIS with BRASP, upgrading to 3031 MVS. London.
W1. Ref 314

ANALYST PROGRAMMER

£4,815
2 years' experience. Knowledge of COBOL, or graduate with Maths or
Computer Science degree. Relocation expenses and lodging allowance
included. Ref 84

SHIFT LEADER

to £5,663
Highly skilled person with excellent knowledge of BOS/POWER/CICS,
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£3,400
Good knowledge of OS, to operate IBM 6885 linked to twin 378/168 3
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Call X-Calibur on 01-353 6201/3 or write to 47 Essex
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Computing Services Association
Agency Licence 55A/3345

X-Calibur

CONTRACT SERVICES

TIMES NEWSPAPERS LIMITED

SENIOR PROGRAMMER

Times Newspapers Limited are currently implementing
one of the most advanced computer based newspaper
production systems in the U.K., utilising data base and
real time techniques on a network of mini-computers.
A Senior Programmer is required who will be responsible
to the group Data Processing Executive for all
aspects of software development.
Applicants must have at least five years' mini-computer
programming experience, preferably using Hewlett-
Packard equipment, and be capable of communicating
with all levels of staff end of planning and controlling
software development projects. Additionally this position
requires several of the following attributes:
—A working knowledge of FORTRAN IV and Assembler
languages.
—Experience of real time and database processing
techniques.
—The ability to write interface software for non-standard
peripherals.
—Experience gained in either the newspaper or publishing
fields.
Salary negotiable depending on qualifications and experience.
Please write with full personal and career details to:
Diamond Hayes, Employment Manager
TIMES NEWSPAPERS LIMITED
200 Gray's Inn Road, London, WC1

Operator Vacancies at Lola

We provide computer facilities as a consortium of
four large London Boroughs. The Computer Centre
is situated in modern premises at Enfield and
current equipment is a 2-megabyte IBM 370/156.
On-line updating facilities are supported on over
100 remote VDU's with programs written in PL/1
running under IMS/VS.

Post 1
Deputy Shift Leaders (3 posts)
Inclusive salary range
£5970-£6331 p.a.

People with drive and enthusiasm who can
demonstrate that they have the necessary high level
of technical and managerial skills required for these
senior posts within the Operations Section.
Candidates must have had at least 4 years'
operating experience on large IBM mainframes
using OS/VS/1 with 2 years at Senior Operator
level. An in-depth knowledge of JCL and IBM
utilities is essential; you should also have had
experience of controlling an IMS/VS network and be
familiar with master terminal operator procedures.

Post 2
Leading Operators (2 posts)
Inclusive salary range
£4722-£5802 p.a.

Candidates should be experienced Operators or
Senior Operators with at least 3 years' experience
on large IBM mainframe equipment using
OS/VS/1 (or comparable operating system).
Knowledge of JCL and IBM utilities is essential and
some experience of large IP environments is desirable.

Post 3
Shift Control Clerks (2 posts)
Inclusive salary range
£4722-£5219 p.a. with possible progression after 6 months to salary range £5330-£5802 p.a.

Candidates must have had a minimum of 3 years'
computing experience, or at least one of which in a
control environment, plus a sound working
knowledge of JCL.

For further information or to make an interview
appointment contact:
Peter Anthony on 01-388 6811, EXT. 266, FOR
POST NUMBERS 1 and 2.
Narman Bennett on 01-388 6811, EXT. 263, FOR
POST NUMBER 3.
3-SHIFT WORKING APPLIES TO ALL POSTS.
LONDON ON-LINE LOCAL AUTHORITIES
Tower Point North
Sydney Road
Enfield, EN2 8UE

LOLA

THE CHEMICAL SOCIETY—

INFORMATION SERVICES

SENIOR PROGRAMMER/ANALYST

Salary to £8,266 p.a.
PROGRAMMER/ANALYST
Salary to £5,362 p.a.

Situated on the Nottingham University campus, CS Information Services
uses the POP 11/70 and ICL System 4/60 computers to help satisfy the
needs of industrial, academic and governmental institutions by producing
information services in chemistry and associated disciplines.

We are seeking the above staff to work as systems for advanced
information retrieval, online data capture and control, production of
printed index publications, and management accounting and publications
distribution systems.

Applicants should have at least 18 months' COBOL programming
experience. Knowledge of assembler and/or POP 11/RSYS/E would be
advantageous.

CS staff enjoy a wide range of facilities provided by the position on the
University campus.

If you feel that you possess the qualities we are looking for and would be
interested in joining us, please send your details and an application form
please contact Mrs. A. Taylor, UKC/19, The University, Nottingham
NG7 2RD, Tel. Nottingham 97411.

UNIVERSITY OF NEWCASTLE UPON TYNE

TEMPORARY PROGRAMMER / DOCUMENTATION OFFICER

The University Administration has ordered a mini-based computing system to replace the existing IBM 1130 configuration. A Programmer is required to assist in the conversion of existing software to the new system and develop on-line facilities for use throughout the Administration.

Applicants should preferably have experience in FORTRAN and BASIC and a knowledge of micro-active computing.

The post is tenable for a period of three years and appointment will be made according to age, qualifications and experience on the Grade 1A (Administrative) scale £3,384-£3,885 p.a. Membership of the appropriate University superannuation scheme will be required.

Applications, giving full details (including the names and addresses of three referees), should be sent to the Finance Officer, The University, Newcastle upon Tyne, NE1 7RU, within 21 days of the appearance of this advertisement.

M.R.C. CLINICAL RESEARCH CENTRE

Westfield Road, Harrogate, North Yorkshire HG1 2JL

APPOINTMENT OF HEAD OF DIVISION OF COMPUTING AND STATISTICS

The Medical Research Council invites applications for the post of Head of the Division of Computing and Statistics at the Clinical Research Centre, Harrogate, Yorkshire.

The person appointed will be required to direct the division's research programme, to maintain a computing and statistical service for the Clinical Research Centre, and also to maintain a close relationship with the Harrogate Hospital Computing Service. The latter research programme will be a major task for the division.

Candidates should be of high academic standing and with proven ability in managing a research unit.

The salary will be within the range for the senior appointments grade which is equivalent to the universities' professional range.

Further information about the appointment may be obtained from the Director, Clinical Research Centre, Westfield Road, Harrogate, Yorkshire, HA1 1JL, Tel. 1837/4672. The final date for the receipt of applications is 5.11.79.

At its London Headquarters, the Authority operates over 1800 370/148 computers connected to a large (1500 terminal) teleprocessing network covering the principal centres of population within the Authority's area.

Interesting developments in this network are at hand involving the evaluation of IUM's Series 7 and similar equipment.

The software environment is VM with OS/VS, VS, OS/VS/1 and CMS. The teleprocessing monitor is SHARE/VS with TP programs written in IBM Assembler. Bar work is handled almost entirely by Informatica MATRIX IV file management system. Applications are invited from suitably qualified persons for the units mentioned below, with the salary range of £7,466-£7,979 per annum.

Project Leader

Program Development
The successful candidate will manage a team of system analysts and programmers in the day to day maintenance and production of new suites of programs to installation standards. Four years' experience of programming and systems analysis, two in a senior role, are a minimum requirement. Knowledge of Informatica Matrix IV and IBM's Series Assembler languages would be an advantage, although more weight will be given to evidence of leadership and organising ability.

Project Leader

Technical Support
The successful candidate will be a wholly experienced systems programmer with the ability to explain and motivate a group of senior specialists. The provision of Unit reports on progress to computer management and the ability to systematically monitor technical activities will also be expected.

Generous Holidays: Pension Scheme — Interchange arrangement. Staff Restaurant.

Applications stating the position applied for and quoting reference CW/ giving full particulars of age, educational qualifications and previous experience should be sent not later than 18 September, 1979, to Laurence O. Wild, C.Eng., F.I.C.E., F.I. Mech. E., F.I.W.E.S., Divisional Manager, Room 880, Thames Water Authority, Metropolitan Water Division, 178 Rosobery Avenue, London, E.C.1.

These posts are open to male and female applicants

Thames Water

CONTRACT PROGRAMMERS

Manchester Area
£8-£10,000 p.a.

Six-month contracts available immediately or up to two months' start for ASSEMBLER/COBOL Programmers, HONEYWELL TOS Programmers and PLAN Programmers.

We have many projects to follow and require persons with over three years' programming experience to join our highly successful freelance team.

Please contact
LEE RICHFIELD LIMITED
(Computer Recruitment Consultants)
Bridge Buildings, Ladybridge Road, Chorlton Hulme
Manchester SK8 5LL
081-486 0591 day or 081-480 6878 evenings/weekends

THE LONDON HOSPITAL Whitechapel, London E1

An outstanding opportunity to work in Britain's largest teaching hospital on some of the most technically advanced computer systems in the world. Computer activities are based on powerful Univac mainframes supported by an extensive communications and minicomputer network with terminals in all wards, laboratories and administrative offices. Extensions of the network are planned to incorporate the neighbouring hospital in Mile End.

Current applications include real-time patient management, resource allocation, radiology and clinical pathology services. The pathology system includes online data-capture of test results from automated laboratory equipment by minicomputers linked to the communications network.

COMPUTER OPERATORS

£3870-£5729
Including shift allowance and enhanced payments (Scotus HC & GA)

Required to participate in the efficient operation of the Univac mainframes which provide a real-time and batch service to the hospital. Operators within this

Installation carry a large measure of responsibility and the persons appointed will be heavily involved in user support, liaison and general trouble shooting.

SYSTEMS DESIGNERS

£5313-£6379 (Scale 9)

An experienced designer, preferably with a background in programming, is required to play a leading role in a specialist user support group.

The group's responsibilities, which involve close liaison with hospital users in the wards, include user education, system enhancement, system integrity and security, and system maintenance.

Applicants should have around 4 years computer experience and a genuine interest in helping hospital staff obtain the best from their extensive computing services.

PROGRAMMERS

£3808-£5680 (Scales 1 & 4)

Programmers with at least 1 years' programming experience (preferably in an assembler language) are required to work in application development teams. Candidates will be involved in the development of real-time nurse allocation or medical record systems.

For further details, telephone me Les King, up to 8.00 p.m. each evening or write to: Modern Computer Services Ltd., Freeport, London WC2N 5BR; 01-438 3381.

Freelance Contracts **MODEM** Permanent Positions
Consultants in Data Processing

CONTRACT OPS

are required to fill contracts in various installations in various parts of the country, some of which have immediate start.

IBM/OS DP	MIDLANDS	★ ICL 2900	W. LONDON
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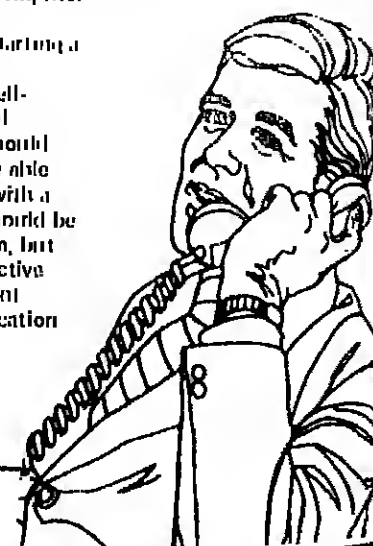
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For further information and application form please write or telephone:

The Executive Officer, Local Government Computer Services Board, Park House, North Circular Road, DUBLIN 7, Telephone: 306188

Latest time for receipt of a completed application form is 6.30 p.m. Friday, September 14th, 1978.

A panel may be set up as a result of these competitions to fill further vacancies should they arise.

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Netherlands: DOS/VS with PL-1 Programmers.
Netherlands: IMS DB/DC under OS — Applications & Systems Programmers.
Switzerland: IMS DB/DC Systems Programmers.

Switzerland: IMS DB/DC Analyst/Programmers.
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Coral 66 Programmers Herts/Bucks Borders

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One of the U.K.'s foremost Hardware Design and Manufacturing groups urgently requires additional team members for one of its prestige projects. Whilst previous hardware experience is not relevant it is essential that applicants are conversant with CORAL 66 and preferably mini Assembler or FORTRAN programming languages. Those who have experience in the development of systems and software, compilers and operating systems are of especial importance, whilst for other positions

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WEST WILTSHIRE DISTRICT COUNCIL RPG 11 PROGRAMMER/ ANALYST

SALARY Approx: £5,300 to £5,860 including all Supplements and Shift allowances

The Council operates an ICL 2903 computer with FBOs and a 7502 based communicating network providing a computer service throughout the authority.

The installation is operational between 7.30 am to 7 pm by means of two shifts, i.e. 7.30 am to 4 pm and 10.30 am to 7 pm.

The machine is due to be upgraded to 2904 in late summer and the Council wishes to appoint one experienced RPG11 Programmer wishing to gain experience in the Analyst sphere. The person appointed will have at least eighteen months experience of RPG11, and a detailed knowledge of ICL 1900 to 2903 Software/Utilities will be regarded as equally important.

If you would like to discuss any aspect before submitting an application form, please contact: D. BENFIELD, Computer Manager on Trowbridge (02214) 63111 ex. 121.

The West Wiltshire District Council area is situated in a pleasant rural location with easy access to the towns of BATH, BRISTOL and the M4/M5 motorways with reasonable house prices. Removal and lodging expenses can be provided in appropriate cases.

Application forms are available from Personnel Officer WEST WILTSHIRE DISTRICT COUNCIL, BRADLEY ROAD, TROWBRIDGE, WILTSHIRE BA14 0RO or by telephone Trowbridge (02214) 63111 ex. 119 (Mrs. Tilly). Closing date 18th July 1978

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Application forms and further details obtainable from: The County Surveyor, Gold House, Cross Street, Preston, PR1 0BB (Preston 54733, Ext. 204), to whom they should be returned by the 15th September, 1978. Please quote Reference 477.

CHELMER INSTITUTE OF HIGHER EDUCATION Victoria Road South, Chelmsford, Essex Faculty of Technology Advisory Unit for Computer Education in Essex

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Systems Analyst LONDON Highly reputed firm of Merchant Bankers with world wide business interests are seeking systems analyst with either financial or insurance experience to work as a key figure within their DP. services division. Ideal applicant should have worked in an IBM installation but any other hardware experience will be considered. * Excellent working environment * Job security * Full banking benefits include subsidised mortgage and personal loans * Salary £7,500 REF 1594	PROGRAMMERS SOUTH COAST Major expanding British Company seeks COBOL programmers, with minimum 2 years' experience. Retaining large IBM 370 and 3031, they are currently developing DL/I database and CICS and have on-going training and development programme financed with substantial budget. Co can offer: * Pretty, coastal location * Good training and excellent scope to move into systems * FULL RELOCATION expenses * Mortgage assistance, non-contrib. pension, subsidised restaurant, free life assurance, etc. * Salary to £6,500 REF 1732	Analyst Programmer CITY Established Merchant Bank has opportunity for person with COBOL and PL/I experience to work primarily as a programmer but also be involved with analysis. This position is in the "investment" area but the company will consider any good commercial background. DL/I database is currently being developed, for which FULL TRAINING will be given. * Large budget allocated for training purposes * Variety of new development including Database * First-rate opportunity to follow an excellent career path * CHEAP MORTGAGE and insurance, low interest loans, season ticket scheme and excellent sports/social club. * Salary £6,000 REF 1711
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ICL OPERATOR West Hertfordshire, 1 yrs. exp. 1900, 2 shifts, own transport, LV's. Usual benefits.	£4000	IBM OPS/SEN OPS A minimum of 12 mths. OS VS1 exp. reqd. for manufacturers Co. based in Midlands.	to £4800
ICL OPERATOR City, 1 yrs. exp. 2903/4, update 2650, 80p LV's, non con. pen., 11% ssa. Excellent prospects.	£3700	IBM OP C. London bank with 370/135 requires Op with DOS VS experience. Exc. benefits.	£4600
ICL OPERATOR North London, 1 yrs. exp. 2903/4, 2 shifts, good company benefits incl. 4 wks. hols.	£3700	IBM OPERATOR International company with West End based 370/135 under OS VS, CICS, 3 shift system.	£4600
ICL OPERATOR City, 6 months exp. 2903/4, 2 shifts, 4 wks. hols, usual company benefits.	£3100	IBM PROD CTRL Reqd. to schedule work, supervise O. Ctrl. and issue with Tech. Supp. 370 OS. DAYS ONLY. Midlands.	£4600
UNIVAC OPERATOR City, 2 yrs. exp. Exec 8, 3 shifts, non con. pen., free lunches, 4 wks. hols, good benefits.	£4600	NCR OPS Century ops with approx. 2 yrs. BI/BI exp. reqd. for financial concern in the City.	c £3000
UNIVAC CTRLR Mature, intelligent person reqd. to organise and supervise Data Ctrl. & Prep. areas. DAYS. N. London.	£4000	BURROUGHS OP Progressive commercial installation in B.W. Surrey requires MCP/1 ops. for 5770 machine.	£4500
DATA CONTROLLER Westminster, 1 yrs. exp. O/C and punching. Days only, some overtime.	£3600	HONEYWELL OP Exp. reqd. for H 2000 under OS 2000 in C. London.	£4000
PDP OP Bus commercial site with DEC PDP 10's, situated in C. London.	£3850	HONEYWELL OP Multi-National requires DECOS op. for large C. installation. Outstanding prospects.	£4200

COMPUTER TWO THOUSAND
217/218 TOTTENHAM CT. RD.
LONDON N17 9AF
01-637 3265

CIVIL AND PUBLIC SERVICES ASSOCIATION OPERATIONS CONTROL ASSISTANT ICL 2903

A new ICL 2903 computer is being installed at the Headquarters of this trade union and a new post of Operations Control Assistant is urgently required. Applicants should have experience of DDES and Data Control. A knowledge of 2903 operations would be an advantage.
Salary scale of £3,877-£4,119 p.a. 24 days' annual leave.

Miss Judy Couch, Office Manager
215 Balham High Road, LONDON SW7 7BQ

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Ring Eddie Farrell
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READY FOR TEAM LEADERSHIP?

circa £6,000

N.W. LONDON

Our clients are a division of a major UK Finance and Leasing group and seek a senior Programmer who is able to make a positive contribution to the development of the new computer section.

It is envisaged that the successful applicant will assume the position of PROGRAMMING TEAM LEADER within 12 months.

The opportunities for further progression are excellent as substantial expansion is planned for the department.

Whilst the ideal candidate should have 2 years' programming experience in basic and on PDP 11's under RSTS, applications are invited from programmers capable of building a programming team preferably with a mini computer background.

For further details ring Steve Morton on: 01-637 0781 or alternatively write enclosing C.V. to: ATA Computer Recruitment, 230 Great Portland Street, London W1N 6HG.

ATA COMPUTER RECRUITMENT

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We are actively recruiting programmers, analyst programmers, Consultants and Senior Consultants for career appointments in Western Holland. The environment you will encounter is one where high quality software design and implementation is essential, and it is important you wish to be involved professionally with individual customers' systems. The company is already established as a leader in its field and expansion planned is considerable throughout Western Europe.

We are particularly interested in

career-minded people who have had experience in an on-line, real-time environment, or switching or networks using mini-computer based systems. Projects you will encounter will be extremely varied, often extensive and usually sophisticated.

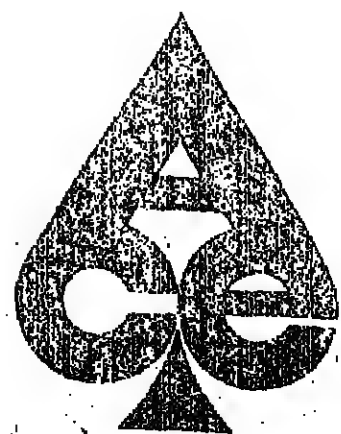
Successful candidates can expect a competitive continental salary (generous tax concessions can also be applied for), interesting and worthwhile job content, excellent conditions of employment and benefits associated with a prestige company.

Telephone me, Bill Seymour, for further details; interviews with our client will take place in London at the end of September.

Bill Seymour 01-581 3754

U.K. Office, Portland House, 4 Gt. Portland St., London W1N 5AA
Andrew Ellis, Sarphatistraat 30, Amsterdam, Holland. Tel. (020) 264684

Accord Computer Efficiency



IBM 370/148

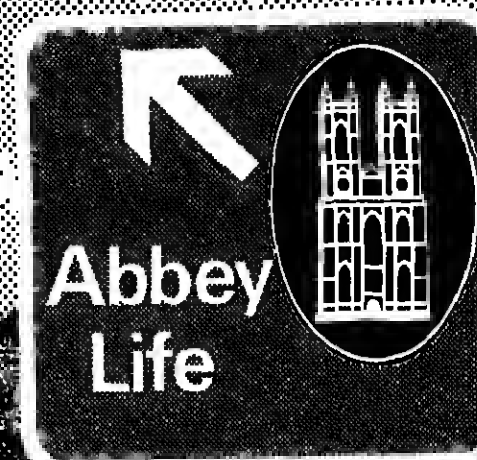
Computer Systems
Analysts &
Designers 5-7K

Computer
Programmers 4-6.5K

Computer Shift
Supervisor 4.5-5.5K
(including Shift Allowances)

Software Systems
Programmers 5-7K

Business Systems
Analysts 4.5-6.5K



Abbey Life's planned expansion is ambitious. We have a strategic plan looking into the next 5 years which include Data Base developments, CICS, DL/I. An IBM 3031 is on order for early 1980. At present we operate a 1 megabyte 370/148 under OS/VS1 on a 3-shift 5-day week basis, and our applications cover a wide range of life assurance, accountancy and information systems. Our prime programming language is COBOL supported by Assembler and Fortran, we use DATAMANAGER and TESTMANAGER for development work.

Salaries are competitive and there is a substantial package of additional benefits.

These include a Subsidised mortgage scheme, Assistance with relocation, Non-contributory pension scheme, Free Life assurance, Subsidised restaurant, Staff discount shop. The Company operates flex time, has first class working conditions in a modern environment, and an active sports and social club.

Interviews will be held in Bournemouth or London. For further details about data processing in Abbey Life and to obtain an application form:-

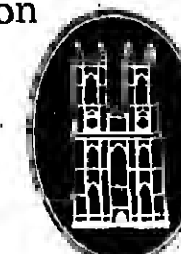
Telephone Barry Greenwood during normal office hours on Bournemouth (0202) 292373, extension 4444.

Outside normal working hours telephone Terry McDowell on Christchurch (02015) 77618 for details of the Shift Supervisor vacancy, and Barry Greenwood on Bournemouth (0202) 761983 for details of all other vacancies.

Write to Barry Greenwood at Systems Administration Department.

Abbey Life

Assurance Company Limited
80 Holdenhurst Road, Bournemouth BH8 8AL



Handwritten signature: Barry Greenwood

SHIFT LEADER

**BRISTOL AVON DIVISION
BATH**

Salary — £4600 to £5000 (Inclusive)

We currently require a Shift Leader to supervise the activities of a team of operators covering operating and control functions on an IBM 370/138 under OS/VS1 with links to terminals in Poole, Bridgwater and Bristol.

This is a comparatively new installation and the opportunity exists for the successful applicant to play a significant part in the overall development of the Operations Section. Working conditions are attractive in well sited offices close to Bath city centre. Assistance with relocation expenses will be given when appropriate.

If you have at least 2 years' IBM experience in an OS/VS1 environment why not ring LEN SALTER or GRAHAM STEVENSON on Bath 313500. Alternatively ring or write for an application form to R. Shergold, Divisional Personnel Officer, P.O. Box 95, The Ambury, Bath BA1 2YP. Bath 313500.

Closing date: September 18th, 1978.

Wessex Water

BRIGHTON POLYTECHNIC COMPUTER CENTRE

The Computer Centre provides services for teaching, research and administration for the Polytechnic and a number of local colleges and schools based on ICL 1801A/Origo M1EV and Hewlett Packard 2000 systems supporting batch, remote batch and multi access facilities. Planning for a major re-equipment programme in the early 1980's is about to begin.

The following vacancies have arisen from the expansion of the newly formed User Services Section:

1. Senior Applications Programmer £4,101-£5,858
To support and develop applications primarily in the areas of Engineering and Environmental Studies. Exceptionally, appointment to this post may be made in the Training grade £2,823-£3,851.
2. Applications Programmer £3,732-£5,073 inclusive of supplements.
To assist development primarily in the areas of Engineering and Environmental Studies. Exceptionally, appointment to this post may be made in the Training grade £2,823-£3,851.

Previous applicants need not re-apply.

Formal qualifications and/or experience of computer applications in the areas indicated are desirable, particularly for the senior post.

For further details and an application form, please contact the Personnel Officer, Brighton Polytechnic, Moulsecomb, Brighton BN2 4GJ. Tel Brighton 68355 Ext. 2537.

For informal enquiries, please contact Helen Beale or Brian Bailey on Ext. 2189/2188.

Closing date 29th September, 1978.

LECTURER II IN OPERATIONS RESEARCH

(Post No. 387)

Responsible for teaching Operations Research and some Statistics and/or Mathematics. Candidates should have an interest in areas such as business, commerce, manufacturing.

LECTURER II/SENIOR LECTURER IN DATA PROCESSING

(Post Nos. 396 and 446)

Candidates should have experience in programming and systems analysis in a business environment. Knowledge of data base applications and/or microprocessors would be an advantage.

SALARY FOR POST 387:
£4,101-£5,858 p.a.

SALARY FOR POSTS 396 and 446:
£4,101-£7,898 (inc. £7,072 p.a.)

Further details and application forms available from Staffing Officer, Leicester Polytechnic, P.O. Box 145, Leicester LE1 6BH. Tel. (0533) 00181, Extn. 2301/2302.

Next week Yorkshire will be at home in Leeds.

We are Yorkshire Imperial Metals Limited and next Thursday we want to meet you in the centre of Leeds at Leeds Interviewing Centre, Suite 203, County House, 82, Vicar Lane. The week after we will be in Manchester and on the 28th September we will be in London. We'll be there any time between 10am and 8pm, so just come in and find why we have so much to offer.

We have recently changed our hardware to a 370/148 running under OS/VS1 and supporting CICS and DL/I and currently need the following people:

SYSTEMS ANALYSTS
With around 5/6 years experience and a detailed knowledge of hardware and software to investigate new techniques.

SENIOR PROGRAMMERS
With around 4/5 years experience and a thorough knowledge of programming to handle large and sophisticated programme suites.

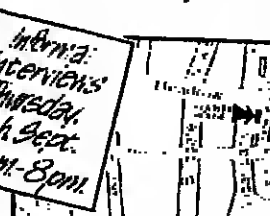


**YORKSHIRE
IMPERIAL**

(Int)

SYSTEMS ENGINEERS

With about 3 years' D.P. experience to develop systems and programming specs and with potential move onto analysis.

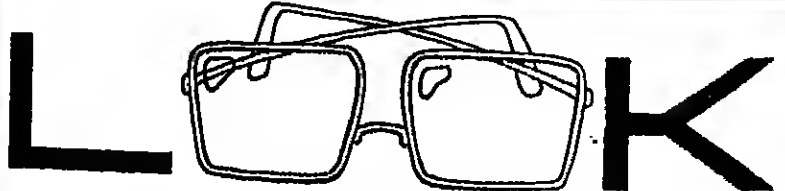


Applicants should preferably be graduates or have a relevant professional qualification.

We can offer salaries of around £1K-£1.5K, many benefits and exceptional prospects within the company, part of a major British Group.

Secure a few minutes next Thursday and call in. If you can't make it, please us on Leeds 106,221 701107, Ext. 424, or write to Senior Appointments Officer, Yorkshire Imperial Metals Limited, P.O. Box 105, Leeds, LS1 1JL.

MYRIAD



TO THE FUTURE

Our client, part of a large international organisation based in North London, and the leader in a specialised manufacturing field, is seeking to extend its Data Processing services throughout the company.

Recently a real-time order processing system has been implemented on the company's Univac 90/30 mainframe. Due to the success of this major project the Data Processing department has currently many enquiries regarding the computerisation of other commercial applications. Responding to this demand opportunities have arisen for the following career-conscious professionals.

SYSTEMS PROGRAMMER

A minimum two years' Assembler programming and one year's systems software experience. The opportunity exists for the ideal candidate to design and recommend an extensive T.P. network throughout the organisation where previous experience would be a definite asset.

ANALYST/PROGRAMMER £5500-£6000

Candidates should have a sound ASSEMBLER background, ideally supported by a knowledge of COBOL, and be able to liaise with users and produce results with minimal supervision.

PROGRAMMER

A minimum two years' commercial COBOL programming background incorporating a high level of self-motivation gained in a Univac 90 Series or IBM 370 environment.

DATA CONTROLLER

Previous experience in installing and maintaining control systems together with the ability to communicate effectively with all levels of staff and management.

Successful applicants will join an installation that enjoys a very flexible working environment and where many company benefits contribute to make this an excellent move in one's career progression.

Myriad Appointments Limited - Computer Personnel Consultants
30 Fleet Street London EC4Y 1AA 01-353 0981 (4 lines)



Newman-Tonks

ANALYST/PROGRAMMER

2903 BIRMINGHAM £NEG.

We are a medium sized manufacturing Company in the West Midlands producing a large range of products which are accepted leaders in their fields. Our current and future work load is mainly on new projects in the Administrative, Financial and Manufacturing areas.

The demands on our Management Services Department continue to grow and we now seek to appoint a wide-spread all-rounder to take initiative and responsibility in a stimulating small team environment.

Our existing configuration consists of an ICL 2903 with EDS 60's and simple communications using 7502 terminals. Exciting developments to both Hardware and Software are envisaged, and you will have a real opportunity to consolidate your own experience whilst contributing to our Company's future development.

Ideally, but not essentially you will have an ICL background with RPG2 and/or Cobol coding experience. Previous involvement with Production Control applications would be an asset.

We offer an attractive salary package together with the usual benefits. Assistance with relocation will be considered where applicable.

Telephone, or write with cv to:

Group Staff Personnel Manager,
NEWMAN-TONKS LTD.,
Lower Tower Street, Birmingham B19 3NN
Tel: 021-359 5461

Senior Computer Operator

Develop with Courage

Courage, a division of the Imperial Group Limited is one of the largest brewing companies in the UK and encompasses breweries, distribution depots and public houses.

Our Data Processing Centre is in a new building in Western Avenue close to Park Royal and North Acton tube stations. Our operation is based on two ICL 1903T computers currently running under George 2S using MAXIMOP. To operate on this configuration and to help implement our advanced systems we are currently looking for a Senior Operator.

You will work on a three shift system. The duties are varied and so offer interesting work in a very pleasant environment. We also provide full internal and external training to allow you to develop your technical skills.

The successful applicant will have at least 18 months experience on ICL 1900 series equipment.

In return we offer an attractive starting salary and the additional benefits of car parking, pension and insurance arrangements, company products discount and subsidised restaurant.

If you would like to contribute towards our further development and success please contact:

Barbara Wren,
Personnel Officer,
Courage Ltd.,
Data Processing Department,
Mansfield House,
335 Western Avenue,
Acton W3. Tel: 01-992 5591.



COURAGE

DATA PROCESSING MANAGER

Our clients are a major international Arab financial institution, based in Riyadh, Saudi Arabia.

They are taking delivery of a brand new ICL 2903/40 in January 1979, and are currently looking for a Data Processing Manager to become involved in the final preparation for the installation of the new machine, and the subsequent running of the installation.

We are looking for the following qualities from applicants:

- * Strong technical background, preferably with knowledge of on-line techniques.
- * Experience of ICL 1900 or preferably, 2903 hardware.
- * Proven managerial skills.
- * Preferably a Financial/Investment-based background, although by no means essential.
- * Preferably aged 28-35, and married.

The benefits include an extremely generous tax-free salary, plus a 6% annual increment; free furnished family accommodation to include utilities and to be based in a compound with swimming pool and tennis courts; medical expenses; private education subsidy; a minimum of two return air-fares for the family to the U.K. every year, and generous additional holidays in Saudi Arabia.

The contract is for two years, on a renewable basis.

Interested applicants should ring O.P. Recruitment Ltd. immediately, quoting ref. DW 927. ALL INTERVIEWS WILL BE HELD DURING THE WEEK SEPTEMBER 11-15, 1978.

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**£15,000
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Siemens Limited is a successful and expanding UK company, part of one of the largest worldwide electrical and electronics engineering organisations.

We now have an exciting opportunity for men and women with 18 months' plus experience to develop, test and maintain computer programmes in a commercial environment. You will be based at our Sunbury Head Office with occasional travel to our branches.

As part of a small, young, DP team and working closely with a Systems Analyst, you will have the opportunity to work on a number of applications which will enable you to develop your full potential. Longer-term prospects could be in systems analysis.

Working conditions are excellent and, in addition to a negotiable salary, benefits include non-contributory pension scheme, 20 days' holiday entitlement, subsidised restaurant and sports and social club.

Contact Phil Bainbridge, Personnel Department, Siemens Limited, Windmill Road, Sunbury-on-Thames, Middlesex. Tel: Sunbury 85691 ext 325/322.

Senior Systems Analyst Systems Analyst Programmer

Wyeth Laboratories have modern offices situated in attractive grounds at Taplow, Maidenhead, Berkshire and a Pharmaceutical Production Unit at Havant, Hampshire.

The Data Processing Department at Taplow is to provide a teleprocessing service to the Havant location in 1979 and the above appointments are to be made to develop and implement production control and accounting systems.

All applicants should have some programming experience and a knowledge of IBM DOS. The Programmer must be able to demonstrate a working knowledge of PL/I.

Applicants for the Senior Systems Analyst and Systems Analyst positions must have had at least three years commercial systems experience and applicants with teleprocessing experience will be preferred.

Please apply giving details of age, experience, and present salary to:-

Mrs. J. Andrews, Personnel Officer
Wyeth Laboratories
Hunleycombe Lane South, Taplow, Maidenhead, Berks.

Wyeth Laboratories

data scene

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Computer Centre

Computer Operator

Applicants are invited for the post of Computer Operator from evening sessions with at least five OCE "O" level passes, or equivalent. Some knowledge of computer operations would be an advantage but training will be given to a suitable person. Commencing salary up to £1042 per annum, inclusive.

Details and application form (to be returned by 18th September, 1978) from the Staffing Officer, Thames Polytechnic, Wallington Road, London SE18 6PF (01-894 2020 Ext. 438).

UNIVERSITY OF GLASGOW COMPUTING SERVICE

Administrative Data

PROGRAMMER

Applicants are invited from evening sessions for the post of Programmer within the Administrative Data Processing Group of the University of Glasgow. Applicants should be in the possession of a University degree or equivalent. Preference will be given to those with at least 2 years' experience of programming in a data processing environment. Salary will be in the range from £1154 to £1585 per annum (commencing with initial placement in accordance with age, qualifications and experience).

Applications should be lodged by 22nd September with the Secretary of the University of Glasgow, 12 The University of Glasgow, Glasgow G12 8QQ. From whom further particulars may be obtained. In reply please quote Reference No. 4255P.

PROGRAMMERS

up to £6,800 pa



**S&C
make the
going
safer**

WE PRODUCE systems using minicomputers and microprocessors to enable Railway Signal control of trains through some of the busiest junctions in the world.

THIS NEEDS co-operation between programmers and engineers from the laboratory, through the factory and into the signal box.

WE WANT Programmers at all seniority levels to work on developments and projects. An engineering background is valuable but not essential.

YOU WILL have the satisfaction of seeing a job through from initial design to working on site.

CONTACT Mr. C.A. Porter, GEC General Signal Limited, Elstree Way, Borehamwood, Herts. Telephone 01-953 8211 extn. 3521, or complete the FREEPOST coupon.

FREEPOST - no postage necessary (cut off on arrow) GEC General Signal Limited, FREEPOST Borehamwood Herts WD6 1BR.

I have experience over:
2 years 3 years 4 years 5 years 6 years 7 years 8 years 9 years 10 years 11 years 12 years 13 years 14 years 15 years 16 years 17 years 18 years 19 years 20 years 21 years 22 years 23 years 24 years 25 years 26 years 27 years 28 years 29 years 30 years 31 years 32 years 33 years 34 years 35 years 36 years 37 years 38 years 39 years 40 years 41 years 42 years 43 years 44 years 45 years 46 years 47 years 48 years 49 years 50 years 51 years 52 years 53 years 54 years 55 years 56 years 57 years 58 years 59 years 60 years 61 years 62 years 63 years 64 years 65 years 66 years 67 years 68 years 69 years 70 years 71 years 72 years 73 years 74 years 75 years 76 years 77 years 78 years 79 years 80 years 81 years 82 years 83 years 84 years 85 years 86 years 87 years 88 years 89 years 90 years 91 years 92 years 93 years 94 years 95 years 96 years 97 years 98 years 99 years 100 years

My present salary is in the range:
£000-£500 £500-£1000 £1000-£1500 £1500-£2000 £2000-£2500 £2500-£3000 £3000-£3500 £3500-£4000 £4000-£4500 £4500-£5000 £5000-£5500 £5500-£6000 £6000-£6500 £6500-£7000 £7000-£7500 £7500-£8000 £8000-£8500 £8500-£9000 £9000-£9500 £9500-£10000 £10000-£10500 £10500-£11000 £11000-£11500 £11500-£12000 £12000-£12500 £12500-£13000 £13000-£13500 £13500-£14000 £14000-£14500 £14500-£15000 £15000-£15500 £15500-£16000 £16000-£16500 £16500-£17000 £17000-£17500 £17500-£18000 £18000-£18500 £18500-£19000 £19000-£19500 £19500-£20000 £20000-£20500 £20500-£21000 £21000-£21500 £21500-£22000 £22000-£22500 £22500-£23000 £23000-£23500 £23500-£24000 £24000-£24500 £24500-£25000 £25000-£25500 £25500-£26000 £26000-£26500 £26500-£27000 £27000-£27500 £27500-£28000 £28000-£28500 £28500-£29000 £29000-£29500 £29500-£30000 £30000-£30500 £30500-£31000 £31000-£31500 £31500-£32000 £32000-£32500 £32500-£33000 £33000-£33500 £33500-£34000 £34000-£34500 £34500-£35000 £35000-£35500 £35500-£36000 £36000-£36500 £36500-£37000 £37000-£37500 £37500-£38000 £38000-£38500 £38500-£39000 £39000-£39500 £39500-£40000 £40000-£40500 £40500-£41000 £41000-£41500 £41500-£42000 £42000-£42500 £42500-£43000 £43000-£43500 £43500-£44000 £44000-£44500 £44500-£45000 £45000-£45500 £45500-£46000 £46000-£46500 £46500-£47000 £47000-£47500 £47500-£48000 £48000-£48500 £48500-£49000 £49000-£49500 £49500-£50000 £50000-£50500 £50500-£51000 £51000-£51500 £51500-£52000 £52000-£52500 £52500-£53000 £53000-£53500 £53500-£54000 £54000-£54500 £54500-£55000 £55000-£55500 £55500-£56000 £56000-£56500 £56500-£57000 £57000-£57500 £57500-£58000 £58000-£58500 £58500-£59000 £59000-£59500 £59500-£60000 £60000-£60500 £60500-£61000 £61000-£61500 £61500-£62000 £62000-£62500 £62500-£63000 £63000-£63500 £63500-£64000 £64000-£64500 £64500-£65000 £65000-£65500 £65500-£66000 £66000-£66500 £66500-£67000 £67000-£67500 £67500-£68000 £68000-£68500 £68500-£69000 £69000-£69500 £69500-£70000 £70000-£70500 £70500-£71000 £71000-£71500 £71500-£72000 £72000-£72500 £72500-£73000 £73000-£73500 £73500-£74000 £74000-£74500 £74500-£75000 £75000-£75500 £75500-£76000 £76000-£76500 £76500-£77000 £77000-£77500 £77500-£78000 £78000-£78500 £78500-£79000 £79000-£79500 £79500-£80000 £80000-£80500 £80500-£81000 £81000-£81500 £81500-£82000 £82000-£82500 £82500-£83000 £83000-£83500 £83500-£84000 £84000-£84500 £84500-£85000 £85000-£85500 £85500-£86000 £86000-£86500 £86500-£87000 £87000-£87500 £87500-£88000 £88000-£88500 £88500-£89000 £89000-£89500 £89500-£90000 £90000-£90500 £90500-£91000 £91000-£91500 £91500-£92000 £92000-£92500 £92500-£93000 £93000-£93500 £93500-£94000 £94000-£94500 £94500-£95000 £95000-£95500 £95500-£96000 £96000-£96500 £96500-£97000 £97000-£97500 £97500-£98000 £98000-£98500 £98500-£99000 £99000-£99500 £99500-£100000 £100000-£100500 £100500-£101000 £101000-£101500 £101500-£102000 £102000-£102500 £102500-£103000 £103000-£103500 £103500-£104000 £104000-£104500 £104500-£105000 £105000-£105500 £105500-£106000 £106000-£106500 £106500-£107000 £107000-£107500 £107500-£108000 £108000-£108500 £108500-£109000 £109000-£109500 £109500-£110000 £110000-£110500 £110500-£111000 £111000-£111500 £111500-£112000 £112000-£112500 £112500-£113000 £113000-£113500 £113500-£114000 £114000-£114500 £114500-£115000 £115000-£115500 £115500-£116000 £116

If you are an Analyst or a Programmer and know your business, American Express would like to meet you either in Brighton, London or Croydon

We have told you before that American Express are growing. Computing is a vital part of that growth. Their European Headquarters are in Brighton, where they operate a 370/158 with OS/VSI using C/C++ and VSAM. The two main programming languages are Assembler and COBOL. They are also currently installing Burrough's B.1800's in Frankfurt and Paris and more installations are planned in other parts of Europe. They also have links to Frankfurt, Paris, Rome, Amsterdam, Brussels, Zurich and Madrid.

They wish to meet a number of Analysts and Programmers who would like to join them in their expansion. As one of the largest IBM users world-wide, they are very anxious to meet anyone with a strong IBM background. As important is a Burrough's background, both in systems and in programming. The opportunities available internationally in this second area are significant.

To enable you to meet American Express at a time that is convenient they have arranged to be at the following places at the following times:

CROYDON

Date: 12th Sept. '78
Time: 3.00-8.00pm
The Park Lane Suites,
The Greyhound
Park Lane,
Croydon

LONDON

Date: 13th Sept. '78
Time: 3.00-8.00pm
Royal Westminster Hotel,
49-57 Buckingham Palace
Road,
London SW1

BRIGHTON

Date: 14th Sept. '78
Time: 1.00-8.00pm
American Express Company
Amex House,
Edward Street,
Brighton.

Incomes are good, there is a comprehensive relocation package, and the career opportunity both in geographic and technical terms is first class. If, however, you cannot attend at the times mentioned, please contact us either by phoning John Goldsmith or by filling in the application form on the opposite page.

One other point, if you have experience in any other area of computing or in management services generally, and would like to work for a dynamic, growing company, then American Express may well have openings that would be attractive. We would like to meet you as well. Ref. 1893/CW.



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TORONTO—CANADA Computer Specialists and Clerical Systems Specialists

Our client is Bell Canada, one of the largest and most successful companies in Canada. They now wish to recruit the following staff for their Corporate Systems Division. In all cases, incomes are extremely attractive and relocation expenses are paid.

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Applicants should possess extensive experience of project design and implementation on medium or large scale applications. They will need a sound knowledge of IBM hardware/software and knowledge of data base techniques would be

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There are also openings for SENIOR ANALYSTS with sound experience of on-line system design, based on IBM operating systems. Ref. 1887.

Data Base Software Specialists

The requirement is for personnel capable of optimising the software supporting a large, multiple user IMS/VS DB/DC system, including 3MPs. Knowledge of DB/DC performance and resource consumption analysis packages is

desirable. At least 2 years' experience with IMS (preferably IMS/VS) is essential. In addition, experience with VSAM and/or TCAM, VTAM would be an asset. Ref. 1888.

O & M Analysts

Candidates should have experience in O & M work across the whole range of business activities, including accounting, production planning and control, purchasing, marketing and inventory control. They should be experienced in work

measurement, used to project management, be capable of presenting and selling proposals, and conducting projects through implementation to user satisfaction. Ref. 1889.

Data Base Design Specialists

Candidates must have strong analytical skills and experience in data base management systems, preferably IMS. A good knowledge of IMS DB/DC,

IMS design aids and performance measurement is highly desirable. Ref. 1890.

Hardware Systems Specialists

Candidates should have a minimum of 3 years' experience in a large scale, IBM hardware and software planning environment. An in-depth knowledge of IBM hardware end plug-compatible

peripheral equipment is required, as well as a good understanding of large scale operating systems. Ref. 1891.

Data Communication Specialists

A minimum of 3 years' in-depth experience with small scale systems (such as PDP11), used as front-ends to large systems, plus a good understanding of communications protocol and

access methods, together with a working knowledge of control program software is also required. Ref. 1892.

Representatives from Bell Canada will be in the United Kingdom during October. We would therefore like to receive applications as quickly as possible. Please apply to John Goldsmith, quoting the appropriate reference number, by either sending a curriculum vitae or asking for an application form.



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THE APPOINTMENT requires an Analyst who is competent in all aspects of analysis as well as being able to supervise a small team and deputise for the Data Processing Manager in his absence. This is an excellent opportunity to join the team at an extremely interesting stage of development, allowing the selected candidate to broaden and contribute his or her skills within a rapidly changing environment. For further details please quote C.W.206.

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HOUSES OF PARLIAMENT

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The successful candidate will have had good management experience and should be able to communicate effectively on both technical and non-technical matters with Members, Senior Officials, Government Departments and the Commons Industry.

This is a senior post, in the House of Commons, and the salary will be commensurate with experience. The salary, however, is likely to be between £10,000 and £12,000.

The appointment will commence as soon as possible after 1st December, 1978 and will be for a period of four years in the first instance. There is a non-contributory pension scheme with intelligence arrangements with other Public Service pension schemes.

Write for further details and application form to: Establishments Section, House of Commons, London SW1A 0AA. Closing date for applications: 2nd October, 1978.

NORTHERN RECRUITMENT FEATURE

Advertisers are reminded that the next Computer Weekly area feature will be published on September 28 and will highlight career opportunities in the North.

Space reservations should be made as soon as possible to:

Owan Kelly — Manchester — 061-872 421
Eddie Farrell — London — 01-261 8097

Copy Deadline: PM Friday before.

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1. We are looking for quality personnel currently working in the role of Systems Analyst/Project Leader preferably with experience in designing systems for Honeywell 66 and Model 6 hardware.
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RE-TRAINING OPPORTUNITIES!

If you have at least 6 months' OPERATING experience in any ICL MACHINE, we may well have a position that will interest you. Our clients often assist with any re-location necessary and in many cases upgrading from 1800-2900 offers excellent training opportunities. Below are just some of the many vacancies. Please contact us if these may suit you. If not — contact JASMINE DAINES for more information.

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Be self motivated, enjoying the prospect of working in charge of a small team with major project responsibility.

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Ascii through the Logic Gate

An epic in 32k words, by Richard Forsyth
Block 14 (Blocked Up)

While Simulo is left to the tender mercies of Inspector Extracode, Cleo is alone with Ascii confronting the wild apemon in the hills — Hex, Lambda and Zep being out cold on the floor of their refuge.

The beast's enormous fur-covered pot-belly filled the doorway. Cleo covered back against the wall.

"Mi na volas dolorigi vin," it bellowed.

"What's it saying?" she asked Ascii in the hope that a blonk dog might understand a talking ape; but Ascii, who lacked the gift of tongues but understood body language very well, had interpreted a body of such size as meaning danger and scampered further up the tunnel.

The creature stooped down and poked its head into the cave. For the first time she got a close-up view of its face. Its ears were very tiny and lay flush against the side of its head. Apart from a slightly protruberant jaw, containing some very big teeth, and a nose that was more like two holes above the mouth than a proper nose, its face had a distinctly human aspect. The tufted red hair that covered its head and chin did not extend across the cheeks or forehead, and its eyes looked too knowing for a mere brute.

She could have sworn it was attempting to smile. Bemused, she shrank further back. She was relieved to see that it was indeed too vast to squeeze inside; but her relief turned to horror when she realised that her three friends were within range of its long arms. She watched aghast as its hand moved out and prodded the 'Off' switch on the black box.

Lambda was the first to react. She yawned and rubbed her eyes as if waking from a long dream, then pulled out the lead that connected her to the computer. When she opened her eyes and saw the creature she displayed little concern.

The apemon, who had made no attempt to molest her, though she was within reach, spoke again: "Ne sentu, timon; mi menghas nur vegetalajn."

"How about that?" exclaimed Lambda, "a talking ape!"

"That's what he said before," said Cleo. "What does it mean?"

"It says: 'Have no fear, I am a vegetarian.' It's Esperanto. I studied it at school."

By now Hex and Zep were stirring.



"Wake up boys," said Lambda enthusiastically, "we've got company."

Hex and Zep stared at the animal, now squatting on its haunches.

"It's a Sasquatch!" cried Zep. "I thought they were extinct."

"That's not half of it," said Lambda. "It can talk too."

"Vie nmiko mi estas," intoned their visitor solemnly.

"I thought you said it spoke English," complained Hex.

"Not English," replied Lambda. "That's Esperanto for 'I am your friend.'"

"Well, tell King Kong we want to be his friends too," said Hex, appreciating its size and proximity.

"Ni ankaw deziras esti viaj amikoj," said Lambda hesitantly; then she apologised to her friends: "I'm afraid I'm a bit rusty."

But it had understood. It clapped its hands in congratulation and was soon prattling away to Lambda, happy to have found a fellow Esperantist to confide in. The

others listened in silence. Even Ascii crept closer again, curiously getting the better of fear. Whenever it paused to draw breath Lambda turned to them and relayed the gist of what she had caught, then said a few halting words back to carry on their peculiar conversation.

It transpired that Zep had been right. It was a Sasquatch, or Pledgeo. But he had also been right in thinking that Sasquatches were extinct. The story that unfolded as Lambda related its utterances was an extraordinary one.

Pitdown, as he called himself, was a laboratory animal — in the strictest sense of that term. Far from being the wild creature they had taken him for, he was a manufactured artefact. He was one of a number of experimental prototypes built by a secret team of specialists working in a subterranean cavern deep within the bowels of the Sierra Nueva, unknown to all but a few high-ranking Sytarm officials. This team, the Advanced Systems Group, had one overriding objective — to design the successor not just for mankind (which was already obsolete) but for the robots and androids men had created in his own image, in short, for the System as a whole.

They learned that Pitdown himself was a sideline, a diversion constructed for entertainment by one of the more brilliant scientists, but that because of his great strength he, unlike his fellow inmates in the menagerie, had been able to break free during a field trial of his dietary habits on the surface. As far as Pitdown was aware the Future System would not depend on individual agents such as robots or androids, still less on home-made Sasquatches. Nevertheless, to perfect the fundamental genetic technology necessary for its production, experiments with fabricated beings such as himself went ahead.

He finished by pointing out that he was sure that a hue and cry had been raised when he escaped and that a search party might soon follow. Immediately Lambda was assailed by a barrage of questions which the other wanted to put to him. This quite overwhelmed her mastery of the language and left her dumb for a moment.

While they waited for her to translate, Ascii, ever alert, gave a plaintive whine. His sensitive ears had detected movement at the top of the entrance tunnel. He bolted out into the crater once more. Hex realised what was going on. The zoogeekers had come to reclaim Pitdown.

"Everybody out!" he shouted, grabbing the precious black box as he ducked out into the open air. Cleo, Lambda, and Zep followed rapidly. Without vesting any time, Pitdown, who had jumped to the same conclusion, ran down to the dead tree-trunk by the water. He wrapped his huge arms round it and uprooted it with one mighty heave, then, grunting, he dragged it to the cave, where he let out a terrifying roar before plugging their exit once and for all.

They were safe for the moment; but, looking up at the cliffs that enclosed them, Cleo couldn't prevent herself exclaiming: "How are we ever going to get out?"

How indeed? There must be some way out of here.

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DIRECTOR: Professor Gordon Black
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For further details of this and other, shorter evening courses, contact the Mathematics Dept., Polytechnic of North London.

Holloway Rd., London N7 8BN. Tel: 01-807 2788 ext. 2309

The Polytechnic of North London

Northern Regional Health Authority

Computer Programmer

The Northern Regional Health Authority require a Computer Programmer with a minimum of two years' COBOL experience. Work carried out includes hospital nursing, financial and community health systems.

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£4,773 to £5,568

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The Council will provide temporary housing accommodation and give assistance with removal expenses as appropriate.

If you would like further details about the post, telephone Mr. Spence on 0422-57122, Ext. 275. Written applications should be sent, together with the name and addresses of two professional referees, to the Personnel Officer, Town Hall, Heliex, by Friday, 19th September, 1978.

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This is a demanding position and the successful applicant will be responsible for seven staff involved in data preparation, data control and computer operating.

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Mersey Regional Health Authority

PROGRAMMER AND ANALYST

SALARY SCALE: £4421 to £5362 p.a.

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THE INSTALLATION

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